AVIATION WEEK

APRIL 30, 1951

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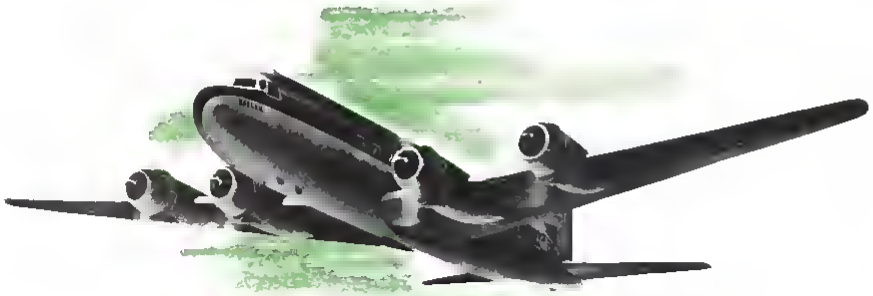

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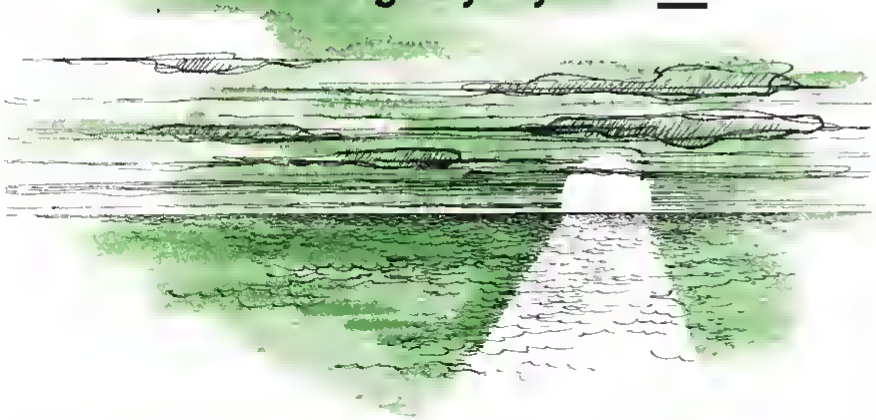

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152

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NEWS DIGEST

DOMESTIC

Relative combat readiness of U. S., Canadian, British and French air arms are to be discussed by top ranking airmen of the respective countries during meeting in Washington, D. C., this week. Policy on MDAP treaty needs will also be mapped out for presentation to their governments. Those present: Hoyt S. Vandenberg, USAF, Air Marshall W. A. Curtiss, Chief of Staff, RCAF; Gen. Charles F. Lecherey, Chief of Staff, FAF; and Sir John Slessor, Chief of Staff, RAF.

Col. Herbert T. Knapp, chief engineer of the World War II Air Transport Command, died in Memphis, Tenn. He was instrumental in designing ATC airfields all over the world, also rehabilitated Jap air bases for USAF FEAF use.

Shipment of 270 one-to ten personal and executive planes worth $2,159,000 was made by 11 firms in March, compared with shipments of 231 planes valued at $1,410,000 by ten companies the previous month. The March figure included 207 four-place or more, 62 two place and 1 one-placer.

National Guard last week called for 300 pilots to fill vacancies in Guard Army units. Bureau headquarters in Washington, D. C., said that the pilots were needed now to fly fixed-wing liaison planes, but may fly copters later.

Bennett E. Meyers former USAF procurement officer at Wright Field, pleaded guilty to income evasion charges, was fined $15,000 and sentenced to prison for a year and a day.

Jacquelme Cochran's world speed record of 469 mph. for propeller-driven planes set earlier this month over 16km course at Indio, Calif., in NAA P-51 was officially recognized by National Aeronautic Assn., an affiliate of the Federation Aeronautique Internationale. Miss Cochran now holds five of the eight recognized world speed records for different distances in the piston engine open class.

Slick Airways has purchased three additional Douglas DC-6A Liftmasters, bringing its current orders for the type to six. The all-freight carrier has taken delivery of its first DC-6A.

International altitude record of 26,820 ft. for the minus 1103-lb. category has been set by Ana Louisa Bringer, flying a Piper Super Cub.

Igor Sikorsky was named first winner of the Dr. Alexander Klemin Award of the American Helicopter Society last week at the Society's seventh forum in Washington. Col. Richard T. Kight, director of MATS Air Rescue Service won the Capt. W. J. Kossler Award, and Brig. Gen. Clayton C. Jerome, Marine Corps Director of Aviation and Assistant Commandant for Air, was awarded an honorary fellowship in the society.

New aluminum alloy, XA78S, announced by Alcoa, has same main alloying constituents as 75S, but is reported about 10 percent higher in tensile and yield strengths, with about the same elongation and fatigue properties. Limited tests indicate increase in mechanical properties will be accompanied by sacrifice in workability. Material will be available only in sheet, plate and extrusions, for the present.

FINANCIAL

North American Aviation reports profit of $2,805,000, after taxes, for the six months ending Mar. 31 on income of $73,930,541. Present backlog is estimated at more than $700 million.

Bell Aircraft Corp. reports profit of $1,468,120 for the year ended Dec. 31, 1950, on income of $36,362,832. For 1949, income was $11,829,475, profit, $204,142.

Mid-Continent Airlines reports net profit after taxes of $355,446 for the year ended Dec. 31, 1950, on operating revenues of $8,238,390. In 1949, net was $340,024 on operating revenues of $7,515,155.

INTERNATIONAL

Panair do Brasil is "contemplating" use of de Havilland jet Comet transports with Rolls-Royce Avons and "considering" an initial order for three planes. If Panair placed such an order, deliveries would not begin before 1954.

Sabena, the Belgian Airline, has ordered six Douglas DC-6Bs.

Switzerland will build 150 de Havilland Venom jet fighters under license.

El Al Israel National Airlines and Jugoslovenski Aerotransport JAT have become active members of the International Air Transport Assn. IATA membership now comprises 65 airlines.

SIDELIGHTS

Military

The Munitions Board's Central Military Procurement Office is moving from the Pentagon to Room 334, Old Post Office Bldg., in downtown Washington so it will be more readily accessible to contract-seeking businessmen. . . Navy celebrates the 40th anniversary of Naval Aviation on May 8. . . To promote more subcontracting some Air Force procurement officials are considering asking permission to grant a greater profit margin on that portion of prime contracts that are subcontracted. . . Naval Air Station, Willow Grove, Pa., has won the 1950 Edward Francis Conway Memorial Trophy for the most proficient naval air station in the Naval Air Reserve Training Command.

Industry

Glenn L. Martin, preparing to produce the Canberra, is going through the inevitable throes of translating British terminology into its U. S. equivalent. One term, "embodiment loan," had to be straightened out by a visiting Briton. It means government furnished property. . . Convair estimates it has paid $371.8 million in payrolls in the Fort Worth area since ground was broken for its Fort Worth plant ten years ago.

People

William Bushnell Stout, otherwise known as Bill, has written his life story, "So Away I Went," just published by Bobbs Merrill, Indianapolis. . . MATS commander Laurence S. Kuter, has been confirmed by the Senate in the temporary rank of lieutenant general. . . Bob Kenney, ex-Fairchild Aircraft division public relations director, is handling public relations for Eric Johnston's Office of Economic Stabilization. . . Hardy Maclay has withdrawn affiliation with Landis & Gewirtz and will continue law practice at 1317 F St., also in Washington. . . Messrs. Landis & Gewirtz are partners in the new law firm of Landis Cohen, Rubin, Schwartz & Gewirtz, also in Washington. . . Fowler W. "Sam" Barker, editor of Air Transport before its merger with Aviation Week, and first secretary of the Air Transport Assn., is now secretary of the just-founded Association of Professional Photogrammetrists, 17 Dupont Circle, Washington, D. C. He resigned as chief of the travel development section of the Commerce Dept. to take on his new job.

Foreign

A fighter capable of some speed in level flight is expected to be announced shortly in Britain. . . Spain got its first glimpse of U. S. jet fighters recently when Germany-based planes participated in exhibitions at Madrid and Seville. . . British private flyers are being "squeezed out of the air," according to figures furnished the House of Commons and reported in The Aeroplane magazine. In the last nine months of 1949, only 470 private flyers' licenses were issued, and only 128 in the first six months of 1950.

NEPTUNE LIFESAVER—A new modification of the Lockheed P2V Neptune patrol plane is this search and rescue version carrying an A-2 lifeboat, but minus most of the Neptune's heavy offensive armament. The P2V's endurance, wide speed range and extensive radar make it very suitable for its new mission.

News Picture Highlights

T-34 TRIAL—Pratt & Whitney's B-17 test bed (left) demonstrates power of its P&W T34 turboprop engine by flying with all four of the 1200-hp. Wright R-1820 Cyclones shut down and props feathered. The T-34 is rated from 5500 to 6000 eshp., depending upon the particular installation. Note the new hollow spinner for the Hamilton Standard Turbo-Hydromatic propeller and the large oil cooler scoop below the nose, originally designed for a coupled T-34.

REGENT ROCKET—R. S. Johnson's latest executive plane design (right) is the four-place all-metal Rocket 260 made by Regent Aircraft Corp., Henderson, Tex., of which he is general manager. With a 260-hp. engine, the Rocket has cruising speed of about 198 mph. at sea level. Span is 30.5 ft. First flight was scheduled for Apr. 22.

HUP-1 TRIES SEA LEGS—During five-day trials aboard escort carrier USS Pahu, the Piasecki HUP-1 made 28 plane-guard flights, flew 22.6 hr. Below left it stands by while Navy checks out new Grumman AF-2s. Copter (right) shown stowed below deck.

WHO'S WHERE

In the Front Office

E C Sulzman has been elected vice president and appointed general sales manager of Jack & Heintz Precision Industries He will make his headquarters in Cleveland Sulzman was for many years with Wright Aeronautical Corp as chief field engineer, then as sales manager In another J&H personnel move, **J Louis Reynolds** has been named assistant to the president and assigned to the firm's expanding field engineering research and development programs, with headquarters in Los Angeles He has been with the company six years, formerly was with the Bell System and Eclipse-Pioneer division of Bendix Aviation

Changes

Edmund O Carmody has joined Stanley Aviation Corp Buffalo N Y, as head of the firm's sales, service and contracts administration In other company moves, **Richard H Frost** has been promoted to assistant chief engineer and **Ernest Karbe** is the new factory manager

R. H Whempner, director of service engineering, aeronautical division, Minneapolis-Honeywell has been named assistant secretary of the company **Russell E. Gage** has joined McCulloch Motors Corp as general manager of the helicopter division **Karl D Breitigan** has been appointed administrative staff assistant for American Electroneering Corp Los Angeles

J E Leonard will take over as manager of Goodyear Tire & Rubber Co's landing gear department on June 1 and the industrial brake department will operate as a separate unit with **C A. Hulsemann** as manager **J. B. Swineford**, manager of flight operations and **J R Seidner**, chief pilot, will report directly to **E M Eickmann**, manager of the company's Aviation Products division Heretofore these operations have been directed by **Clarence O Bell**, who has resigned to become a consultant to the company on aviation products

A H Keener has been appointed advertising and public relations manager for California Central Airlines **George E Bounds** is the new director of public relations for Chicago & Southern Air Lines, succeeding **Larry Keil**, who has resigned but not yet revealed his former plans, although he plans to stay in the air transport field

Clay Morgan has been appointed director of public relations for the North American and Caribbean division of Air France

Honors and Elections

Otto A. Seyferth, president of the U S Chamber of Commerce and **Robert J Watson**, vice president, personnel and properties, Capital Airlines, have been named as new members of the carrier's board Capital directors re-elected all 13 members of the previous board

INDUSTRY OBSERVER

► A cockpit loss-of-power indicator operating on thermal principles is expected to be incorporated soon into planes fitted with the Allison T-40 turboprop engine, along with an automatic declutching device. The new safety devices are probably an outgrowth of the accident involving the Douglas XA2D Navy attack fighter at Edwards AFB. It is understood that examination of the crashed plane indicated failure in flight of several stages of compressor blades in the right section of the T-40 powerplant.

► A new sandwich material proposed for aircraft skin, which uses aluminum foil as filler between two "shees" of aluminum sheet, does not show any advantage in strength weight ratio over conventional aluminum sheet, according to a Phase I study on the material made for the USAF by Boeing Airplane Co

► North American Aviation is building an electronic heating device for attachment to a band saw, under an Air Force Manufacturers' Methods contract Unit will heat material at point where it is being sawed, softening it and making possible faster cutting and conservation of saw blades.

► Republic Aviation is joining the trend to design of one-piece airplane parts by forging Currently under development at Republic is a one piece forged stabilizer panel of magnesium alloy, for the F-84 jet fighter It is expected to replace a conventional stabilizer assembly composed of more than 100 pieces Another Republic project is for a one-piece forging of an F-84 fighter bulkhead.

► USAF project to fly a Curtiss supersonic propeller on the nose of a McDonnell XF-88 is awaiting installation of the special gearbox being built by Allison for its T-38 engine, which will power the propeller. The plane will also retain its two Westinghouse J-34 turbojets, which were original powerplants With combined powerplants the sweptwing XF-88 should find it well within its capabilities to take the propeller through the transonic speed range to be the first supersonic propeller-driven plane.

► Add to the list of proposed modifications to stretch capabilities of existing aircraft to new speeds a report that Boeing is proposing a sweptwing version of the Air Force's C-97 double-deck Stratofreighter, probably with the same 35 deg sweepback which has proved so successful on the B-47 Stratojet bomber wing

► A new Air Force competition for fighter-bombers has probably the widest latitude of specifications that has been laid down in many a day. It has attracted Martin and Fairchild—manufacturers who are known chiefly for their work in other types of aircraft development—and two hot fighter builders, Lockheed and Douglas

► North American Aviation is moving its program of remanufacturing T-6G trainers to its Columbus, Ohio, plant from Long Beach, and will phase out the Long Beach T-6C program with the last airplane completed in October Columbus is due to tear down its first T-6 in April and roll out the first refurbished T-6G in August Production rate of 100 T-6Gs a month is planned for Columbus by next year

► Negotiations are underway between KLM and Fokker Aircraft, Amsterdam, for construction of four-engined jet transports as replacements for those U S. aircraft in the KLM fleet that now are obsolescent. Current KLM fleet consists of 18 Lockheed Constellations, 7 Douglas DC-6s, 12 DC-4s, 4 DC-3s, and 16 Dakotas Proposed Fokker replacement is still in the engineering stage.

► No sizable government development contracts are now being carried on in the piston engine field. Whatever development work on piston engines still remains is being done by industry itself. But the military services expect to use them for smaller power requirements in trainers, light transports and helicopters, until efficiency and cost of smaller turbines is good enough to displace pistons in this segment of the powerplant field

Washington Roundup

MacArthur on Air Power (2)

Gen. Douglas MacArthur's address to Congress called for a rigid non appeasement course for this country His message, in essence, was that the U S must frontally, and not with half-hearted ground "police actions," meet the challenge of Russian aggression, be it in Europe or in Asia—or on both fronts at once

His words

"There are those who claim that our strength is inadequate to protect on both fronts, that we cannot divide our effort I can think of no greater expression of defeatism"

At congressional hearings, due in May, MacArthur is expected to spell out his strategic concept for such a course Washington observers anticipate it as: invincible air power, buttressed by adequate naval power for blockade actions and keeping sea lanes open, and sufficient ground forces for base protection and initial occupation

In his congressional speech, MacArthur wrote off a U S ground war in China as inconceivable, with a passing phrase He is expected to dismiss a ground war in Europe for the same reason The manpower resources of the U S and all its allies are feeble before the masses the Kremlin could command to oppose them, and it would wreck the free nations' economies to keep such token forces mobilized

MacArthur's views on defense of the Pacific "With naval and air supremacy and modest ground elements to defend bases, any major attack from continental Asia toward us or our friends in the Pacific would be doomed to failure"

He is expected to give the same answer to defense of the Atlantic area

It adds up to an all-powerful air force for offense and defense

A boyhood friend of "Billy" Mitchell, the prophetic crusader of the '20s for air power, MacArthur today has the strategic position to boom air power that Mitchell never had And Washington observers have already said he will—with pronouncements electrifying others to take up the rough and tumble of the campaigning

Although most of the U S Air Force will likely be with MacArthur in spirit, USAF Chief of Staff Gen. Hoyt Vandenberg may be called on by Defense Dept. to speak in opposition To keep his job, he probably will

Army's Air Generals

Over a decade and a half since the late "Billy" Mitchell was convicted of insubordination by an Army court martial for supporting air power, just two top army generals have had real faith in air power, observers say, and, within their powers, have done everything possible to promote its development Gen Douglas MacArthur and Gen Dwight Eisenhower

This is the opinion of many key USAF career officers

USAF generals "like" Eisenhower, but as far as air power goes, think he might swerve for political consideration No USAF general indicated the slightest "liking" for MacArthur But those polled by AVIATION WEEK were unanimously convinced he was "for" air power and would remain so

At suggestion of Secretary of Defense Gen George Marshall and Chairman of the Joint Chiefs of Staff Gen Omar Bradley, USAF generals are silent These two dominate Defense Department policy, putting emphasis on build up of the ground forces to implement State Department's policy of police action "containments" of Russian aggression

Vandenberg's Replies

USAF's Chief of Staff is a cautious letter writer, apparently

Congressmen, since the beginning of the year, have written him, asking such incendiary questions as why he doesn't support all-out air power, what he thinks about ex-USAF Chief of Staff Gen Carl Spaatz's proposal for 250 air groups Vandenberg doesn't answer the letters

But, about two weeks after the letter is sent, the dispatching congressman generally receives a photograph of the general with a nice inscription

Mitchell's Return

Since the word that Gen Douglas MacArthur might take up the cause for air power of the late "Billy" Mitchell seeped out to official Washington, Republican and Democratic senators and representatives have gone on a reading spree of books on and about Mitchell

A check last week showed all books by or about Mitchell were checked out of the Congressional Library by members of Congress The city's three major second-hand bookshops reported that "after an awful rush" they were completely sold out of anything that even mentioned Mitchell

Many Republican politicos on the MacArthur band wagon, who in the past have generally looked on air power as one more item of expense that ought to be cut down to a minimum, are now ready to open the nation's pocketbook for an all out air build-up

They relish Mitchell's quotes portraying MacArthur as the only member of his court martial board that sympathized with him

Democratic politicos, who generally took no countermeasures against the 1949 Truman Johnson slashback in the 70 group air power program, are intent on portraying MacArthur as the aged reactionary dedicated to the impairment of the development of air power They have only a few descriptive clauses in Mitchell's writings to cling to for proof But they're already making much ado about them In a major floor address against MacArthur, Democratic Rep Chet Holifield deplored MacArthur's role in the court martial of Mitchell These two Mitchell quotes, he claimed, showed MacArthur was against air power

"MacArthur, whom I admired for his courage, his audacity and sincerity, surely could not be part of this But here he was, his features as cold as carved stone"

And, referring to MacArthur's father, Gen Arthur MacArthur, under whom he served in the Philippine insurrection, Mitchell recorded

"And there was his son, a brave soldier, appointed to stripe me in mid-career, in an argument over a machine which might some day save the Philippine Islands"

Although MacArthur might have looked "cold as carved stone," evidence disclosed to AVIATION WEEK shows that MacArthur alone voted against the court martial verdict that sentenced Mitchell and "a machine which might some day save the Philippine Islands" to temporary oblivion —Katherine Johnsen

AVIATION WEEK VOL 54, NO 18 APRIL 30, 1951

AF Freezes Plane Types to Speed Output

B-47C projects is halted; B model plans stepped up.

By Ben S. Lee

Production of planes for the USAF has been virtually frozen to current combat types by a USAF directive to Air Materiel Command, it was learned last week. This step was felt necessary to boost production and enable industry to reach the previously announced goal of a 95-group structure and the capacity to double that strength by mid-1952

Top priority aircraft affected by this decision, Air Force under-secretary John A McCone told AVIATION WEEK, is the Boeing six-jet B-47B. Plans to convert production from the B to a four-jet B-47C, after the 88th B model, have been postponed by the freeze order

BDV CHANGED World War II's famed B-29 combine of Boeing-Douglas-Vega (for Lockheed) are back in business for the B-47 and Col. Harley S. Jones field project officer, discusses plans with the trio's liaison chiefs left to right Robert I Mitchell Lockheed, Lee Howard, Boeing, Larry C Sebring, Douglas

► **Unfounded Conservation**—This and other similar freeze decisions under consideration may have caused unfounded consternation among some segments of both first and second source suppliers (licensors and licensees), McCone pointed out Plans for the 95-group structure and parallel broadening of the industrial base remain unchanged, he said

Two separate situations, the Air Force procurement expert explained, have caused the freeze order.

• **3rd supplemental.** Downward revision of funds originally programmed for inclusion under final 1951 budget requests forced a re-scheduling of planned total obligations Budget requests are made to provide the first and second source suppliers with sufficient cash to enter production phase Balance of funds to meet presently programmed production schedules will be provided out of fiscal '52 budgets

• **Combat experience.** Lessons learned thus far in the Korean campaign have already dictated need for an early-as-possible replacement of certain World War II vintage equipment The Boeing B-29 has proven to be no match for the swift Russian MiG 15 jet fighters And Air Force does not expect the improved B-50 Superfortresses will have enough speed to fare much better against the MiGs, unescorted. Need for effective jet escort to enable the bombers to cope with the MiG-15 is prime reason for arrival of the North American F-86 Sabre jets in the theater

Revision of B-47 production plans postponing the B-47C have no effect whatsoever on scheduled production of the plane by second-source suppliers, McCone declared In effect, it crystallizes schedules of the suppliers and simultaneously assures the Air Force and the nation of adequate numbers of the bomber in consonance with current in being timetables, he said.

"Production planning of the Boeing B-47B was completed at Wichita two weeks ago during a meeting of top officials of Boeing, the Douglas Aircraft Co. and Lockheed Aircraft Corp, myself, and other members of the Air Force," McCone declared

► **Second Supplier**—The Air Force some months ago announced that Douglas would become a second supplier of the B-47 at its World War II Tulsa bomber plant More recently, it was announced that Lockheed would reactivate the old Bell Marietta, Ga., plant for B-29 modification and that it would be tooled for additional B-47 production While no detailed schedules for B-47 production for the plants have been disclosed, it is reported in authoritative quarters that Air Force has ordered several hundred of the big jet bombers

In connection with postponement of the B-47C series and to dispel some automotive engine supplier apprehension that heavy production engine schedules presently programmed might be cut back as a result, McCone cited the case of the planned production of the Allison J-35-A-23 engine previously scheduled for that aircraft

As soon as Allison and Chevrolet divisions of GMC get into production with the J-35-A-23 Allison engine, he said, current plans are to substitute present production CE J-47 engines now equipping the six-engined B with the more powerful Allison jet engine (The Allison J-35-A-23 is rated at approximately 10,000 lb thrust, AVIATION WEEK, Mar. 19)

► **Conversion Result**—Previously he continued, it had been planned that the Allison engine would power the four jet-engined C configuration In effect, through rescheduling of the B-47 program and postponing the B-47C, we are gaining a still more powerful, still heavier bomber without loss of production time in converting from one configuration to another.

Industry sources in Washington, meanwhile, indicate that Boeing has already submitted design proposals for an all turbo-prop powered version of the B-47 which would almost double its range Air Force sources state that the B-47 with turbo-prop powerplants

of equivalent horse power would have almost twice the range of the current B-47B now in production

The hitherto undisclosed freeze on current production types has no effect upon development, testing and production programming of still experimental aircraft What the order does do is to halt major modification on current production aircraft unless those changes are approved by top USAF headquarter echelons

▶**Freeze Order**—It is assumed that the freeze order will be somewhat similar to the plan followed in World War II when modifications were frozen for a model for production blocks of 500 planes in some cases This method of production freezing makes it possible to plan model changes which can be phased into the production program at planned intervals with minimum production flow interruptions

While the B-47 freeze order is the only one which as yet has been disclosed it is probable that similar freezes are going into effect on present production status of other principal airplanes and engines in the Air Force program

• **In fighters** the freeze is expected to apply to current production models of the Lockheed F 94C, North American F-86D and E, Northrop F 89B and the Republic F-84E and F

• **In transports** it will doubtlessly include the Fairchild C 119C the Chase YC-123 the Douglas C-124A, and the Boeing C 97C

• **In trainers**, the North American T-28, Convair T 29 and the Lockheed T-33

The Convair B 36 intercontinental bomber is already virtually frozen in its present configuration and will continue in production on that basis pending test of the advanced sweptwing version under construction at Ft Worth

Convair, SMU Start Engineer Training

Consolidated Vultee in an effort to offset the scarcity of aeronautical and electronics engineers, will offer studies leading to degree of Master of Sciences in Engineering at the Convair plant near Ft Worth, in cooperation with Southern Methodist University

The company said that approximately 35 graduate engineers of the Convair plant have already signed up for the course and are to be trained by SMU professors and qualified Convair engineers

Two degrees are to be offered the students—Master of Science in Electrical Engineering with an option in electronics and Master of Science in Mechanical Engineering, with an option in structures or power plants

AF Makes Convertaplane Awards

Three different approaches to problem, represented by Sikorsky, Bell, McDonnell designs, get contracts.

By Alexander McSurely

Three leading aircraft manufacturers, Sikorsky, Bell and McDonnell, last week won three Air Force Phase I contracts for convertaplane designs under a development program jointly financed by the Army and the Air Force

The contracts are the first step toward development of a new type of rotary aircraft, which it is hoped will combine the advantages of vertical lift and hovering flight, with those of relatively high speed level flight, well beyond the speeds attained by today's helicopters

Of 19 designs submitted by 17 companies in the competition conducted by Air Materiel Command at Wright-Patterson AFB, Dayton, virtually all could be classified in three groups, and the three winning designs were selected as the most logical expositions of these three approaches to the problem of combining vertical flight and horizontal flight

▶**The Army Aim**—The design competition just completed will be for relatively small aircraft, for use by the Army Field Forces as liaison types and to furnish engineering data for future designs of larger size But an idea of the type of performance aimed at is seen in Army requirements previously laid down for an aircraft which can do 350 mph in horizontal flight and will have a hovering ceiling of 5000 ft and a service ceiling of 10 000 ft This compares with today's world helicopter speed record of just over 130 mph and with hovering ceiling and service ceiling well above the Army convertaplane helicopter requirements

Here is the way the three winning designs stacked up

• **Unloaded rotor** McDonnell Aircraft Corp, St Louis, submitted the design considered best in this convertaplane category. In general it calls for an aircraft with a helicopter type rotor for takeoffs and landings, and with fixed wings to provide lift in forward flight Propellers or jets provide propulsion Lift of the fixed wing serves to take the load from the rotor, so that the latter does not carry much of the burden in horizontal flight

Actually, this type of convertaplane is not far in principle from the prewar autogyros built by Putcairn, Kellett and others Some of the autogyros applied power to their rotors to achieve a jump takeoff, and then declutched the rotors for autorotation

The windmilling rotor, in the postwar designs, might have its blades turned to a feathered angle for less drag if the wings provided sufficient lift to unload the rotor completely for horizontal flight It was reported that at least one McDonnell alternate proposal in the convertaplane competition called for use of the Allison T 38 turboprop engine

• **Tilting rotor.** Bell Aircraft Corp, Buffalo, was named winner for the tilting rotor category, which many designers consider the most ideal approach to the convertaplane design problem In general, this calls for a fixed wing aircraft with combination rotor-propellers mounted at the wingtips These act as helicopter rotors for takeoffs and landing but after the aircraft attains cruising altitude the props are tilted forward approximately 90 degrees to operate as conventional propellers

Bell has been investigating the convertaplane aspects of rotary wing aircraft ever since 1943 not long after it entered the helicopter field

• **Retractable rotors** Sikorsky's design for a retractable rotor convertaplane, which won the third design contract, provides for a fixed-wing aircraft with jet power for forward propulsion and with a rotor which can be braked to a stop and retracted, presumably into the top of the fuselage, when the aircraft gets to cruising altitude

While many rotary wing aircraft designers have long considered convertaplanes as the ultimate approach to a combination of the most desirable flight characteristics, the mechanical problems involved have posed such difficulties that conservative engineers have questioned the possibility of ever achieving a practical machine In view of many mechanical and power advances made in recent years which can be applied to this new field however, new hope is seen for solution of the admittedly difficult problems which are involved

▶**New Design Advances**—Some of the most difficult problems are in relation to the combination rotor propellers, which serve two quite different functions in horizontal and vertical flight Here it is believed that new advances in design of extremely thin blades which can be whirled at supersonic speeds may aid in the compromise of selecting blades which will do the jobs of both lifting and propelling This would permit the use of much smaller diameter rotors whirling at much faster speeds They would be much closer to propeller requirements for forward flight

18th AF's Joh: Troop Transport

Pointing up the new emphasis Air Force is placing on air ground matters, USAF has activated the 18th Air Force (Troop Carrier) at Greenville, S C Establishment of the unit brings to 13 the number of air forces composing the air department

Troop carrier units previously have been assigned as utility squadrons in the group structure of the air forces Under the new organization, the 18th will combine under one organization all troop carrier units in continental U S Primary responsibility will be to perform troop transport needs of Army and to develop and coordinate air-ground techniques for assault transport.

▶**The Air Forces**—Here is an up-to-date roundup of air forces in the department of the Air Force

• **CONAC**, Continental Air Command comprises the 1st with headquarters at Mitchell AFB, N Y; 4th, Hamilton AFB, Calif; 10th, Selfridge AFB, Mich, and 14th, Robbins AFB, Ga

Aircraft used by these air forces are for the most part "second line" and are mainly administrative and utility planes

• **SAC**, Strategic Air Command comprises three air forces—the 2nd, Barksdale AFB, La, the 8th, Carswell AFB, Tex, and the 15th, March AFB, Calif Planes in the SAC force are mainly medium and heavy bombardment aircraft including the B-36, B-29, B-50, aerial refuelers such as the KB 29, KB-50 and KB 97, and a number of F 84E escort fighters

• **TAC**, Tactical Air Command comprises the 9th Air Force, Pope AFB Ft Bragg, N C, and the newly established 18th, Greenville AFB, S C The 9th uses a variety of fighter bomber types including the piston engined F 51 B 26 and the F 84E The 18th will use the Fairchild C 119 and the Chase YC-122C As the Chase C 123 goes into production, the type will be used to round out group structure included under the jurisdiction of the 18th

• **FEAF**, Far Eastern Air Forces are comprised of the 5th Air Force currently based at Seoul, Korea, and the 20th Air Force based at Kadena AFB, Japan. The 5th is considered a fighter wing and has practically all of USAF's latest production fighters including the F-84E, F-86A, plus quantities of the Lockheed F-80 and a number of Douglas piston-engined B-26 light bombers The 20th uses mostly the B-29 for its medium bomber missions, although some B-50s and the jet RB-45s are in the theater for battle evaluation

• **HQ Philippines Command (AF).** This command comprises of the 13th Air Force and is made up of fighter units Many of its first-line combat planes have been diverted to FEAF 5th AF control for the duration of the Korean effort

• **USAFE.** United States Air Forces in Europe controls the 12th Air Force, composed mainly of fighter groups and troop carrier squadrons. With headquarters at Weisbaden, Germany, the 12th flies a great variety of utility, fighter and bomber types

• **ADC.** Air Defense Command, formerly an organization in the Continental Air Command, became a separate entity Jan 1 It is made up of three separate defense areas—Eastern, Central and Western Air Defense Commands. ADC includes no numbered air forces The same is true of the Alaskan Air Command Both commands utilize varied first-line combat and utility types of aircraft

In the United States, jurisdictional boundaries of the air forces conform to jurisdictional control boundaries of Army areas with two exceptions The 14th Air Force includes the 3rd and 4th Army areas and the 1st Air Force includes First and Second Army area

Airline Maintenance Meeting in Chicago

Chicago—A group of airline engineers met here last week to try to untie some of the maintenance knots that have puzzled their industry the past year

That goal was set before the annual Engineering and Maintenance Conference of the Air Transport Assn by Stanley R Shatto, vice president- operations of Western Air Lines and chairman of the 1951 annual meeting of the group

Shatto underlined the stature of the aviation industry and importance of the conference by reminding his listeners that they administer more than $100 million worth of expenditures yearly and keep more than 1000 aircraft in the air

He spoke to 507 top engineering and maintenance personnel from U S and foreign airlines, and representatives of airframe, engine, propeller, equipment and petroleum companies and military and government agencies, here for the three-day meeting

Shatto cited an example of the changes the industry has seen by comparing 1925 Douglas M-2s and 1951 Douglas DC 6Bs Although both had about the same power loading, he said, wing loading of the DC-6B has increased seven-fold

He concluded his talk with an appeal to the conferees to "speak up and say what you want."

Sharp Improvement In Martin Position

Effect of the Korean military action and subsequent arms buildup on some aircraft companies has never been more accurately pinpointed than in the 1950 annual report of the Glenn L Martin Co Last year Martin sales were off and backlog increase was not keeping pace with that of other aircraft companies

▶**Trend Reversed**—The emergency program sharply reversed the trend Martin finished the year with income of $40,483,713, as against $52,055,000 in 1949, but the backlog jumped from $72 million in January, 1950, to $195 million in December Last week it was reported at $287 million And even that does not include the USAF Canberra order, or a Coast Guard order for two 4 0 4s

The grim outlook Martin faced before the emergency program started is indicated in the report Last June 30, the backlog stood at $95 million, and a great portion of it—if not the largest part—was commercial Tooling and materials for its commercial production ate heavily into Martin's cash At year-end, cash had dropped from $10,249,000 to $7,274,000 and working capital had slid from $11,085,000 to $10,950,000 Advance payments totaling $9 9 million from TWA and Eastern Air Lines on their 4 0 4 orders helped Martin over the hump

Martin's profit in 1950, after taxes, was $3,127,774 The previous year it had been $5,131,000, although that had included some non-recurring credits

That was the situation facing Martin when it received its "substantial" production contract from USAF for the Canberra This is the first large Air Force order Martin has received since the war and the resumption of friendly relations with the Air Force probably marks the biggest step forward Martin has made since the war This probably will be the backbone of the company's business for the next few years

▶**Navy Business**—In 1950, Martin was still primarily a Navy contractor It completed deliveries on its P4M 1 Mercator patrol planes, and was in production on the P5M-1 Marlin anti-submarine flying boat It began deliveries on a Navy guided missile the KDM-1 Plover aerial target Its chief Air Force business was development of the Matador guided missile Subcontracting for Grumman and other manufacturers filled out the Martin schedule

Rise in employment is symptomatic of the turn in Martin's fortunes In February of 1950, 7000 were employed in the 2,700,000-sq ft Middle River, Md., plant At the end of the year, employment had risen to 11,355 Today it is 14,500, and will continue to climb

It's a Glider . . .

. . . It's a Piston Plane . . .

. . . It's a Jet Plane

XC-123A: First U.S. Jet Transport

Trenton, N. J—USAF's first all-jet cargo transport, the Chase XC-123A, made its first successful test flight last week, becoming the first aircraft in the world to have flown piston powered, jet powered, or as a glider without the use of engines.

The experimental jet transport is equipped with four GE J 47 jet engines developing 5200 lb. thrust each. On its first takeoff the plane was airborne after a run of just over 1000 ft., and climbed at approximately 35 deg. Observers estimated its speed at considerably over the 300-mph. mark in its only low pass over the field.

On its second test flight the plane was airborne after a takeoff run just over 700 ft. Company officials predict that, after additional flight experience, the jet version will be able to attain essentially the same landing and takeoff performance as its piston-engined sister plane, the YC-123.

SEC Survey Lists Stock Holdings

William A. Patterson, president of United Air Lines, exercised option to buy 2817 shares of common stock, making a total holding of 8667 shares, according to Securities and Exchange Commission's latest survey.

Also reported in the survey were the exercise of options for purchase of a total of 4500 common shares by four Capital Airlines directors. They are:

George R. Hann, director, exercise of option to buy 2100 common shares, making a total holding of 15,000 shares; Charles H. Murchison, director, purchase of 2000 common shares making a total holding of 10,300 shares, and sale of $40,000 B debenture shares, total holding; Hayes Devereux, director, purchase of 300 common shares, for a total holding of 400 shares, and Raymond C. Lochiel, director, purchase of 100 common shares, making a total holding of 1535 shares.

Other recent transactions by aviation equipment officials reported included:

● **Air Associates, Inc.** Haven B. Page, director, sale of 3000 common shares, total holding. Sale of 6400 common shares from the Haven B. Page trust, leaving a total holding of 600 shares.

● **Air Fleets Inc.** O. C. Sawyer, officer, sale of 5 common shares leaving a total holding of 10 shares.

● **Alaska Airlines, Inc.** M. Doherty, officer, purchase of 400 common shares making a total holding of 2025 shares.

● **Boeing Airplane Co.** Harold E. Bowman, director, sale of 100 common shares, leaving a total holding of 235 shares.

● **Braniff Airways.** T. E. Braniff, director, sale of 1000 common shares, leaving a total holding of 270,224 shares. John B. Walker, officer, sale of 200 common shares, total holding.

● **Consolidated Vultee Aircraft Corp.** LaMotte T. Cohu, director, sale of 400 common shares leaving a total holding of 11,600 shares. Leland W. Miller, officer, sale of 600 common shares, leaving a total holding of 2200 shares. Robert F. Waite, officer, sale of 1100 common shares, leaving a total holding of 2153 shares.

● **Fastern Air Lines.** S. Peabody, Jr., purchase of 500 common shares and sale of 200 common shares leaving a total holding of 300 shares.

● **Fairchild Camera and Instrument Corp.** S. M. Fairchild, director, purchase of 100 common shares, making a total holding of 76,320 shares. Deposit Carrier Co., purchase of 300 common shares, total holding. Joint Account, for Clark H. Minor, director, purchase of 400 common shares, making a total holding of 800 shares.

● **Lockheed Aircraft Corp.** Hall L. Hibbard, director, sale of 1700 common shares, leaving a total holding of 4228 shares.

● **National Airlines.** Joseph Merrick Jones, director, purchase of 500 common shares, making a total holding of 9300 shares.

● **Northeast Airlines.** Paul F. Collins, director, sale of 1000 common shares, leaving a total holding of 1000 shares.

● **Northrop Aircraft.** John W. Myers, director, purchase of 1400 common shares, making a total holding of 1800 shares; Oliver P. Echols, director, purchase of 600 common shares, making a total holding of 3300 shares; Walter H. Rolapp, director, purchase of 100 common shares, making a total holding of 200 shares.

● **Pan American World Airways.** Henry H. Berke, officer, purchase of 200 common shares, making a total holding of 613 shares; Robert G. Ferguson, officer, receipt of 300 shares under a compensation plan making a total holding of 771 shares; William L. Morrison, officer, receipt of 500 common shares under a compensation plan making a total holding of 6000 shares; Henry J. Friendly, director, sale of 300 common shares leaving a total holding of 2770 shares; Harold E. Gray, officer, purchase of 400 common shares, making a total holding of 400 shares; John S. Woodridge, officer, sale of 600 common shares, leaving a total holding of 200 shares.

● **Piper Aircraft Corp.** William Thomas Piper, director, sale of 200 preferred shares, leaving a total holding of 8780 shares.

● **Republic Aviation Corp.** Tom A. Murphy, officer, sale of 100 common shares, total holding.

● **Rheem Manufacturing Co.** George M. Greenwood, director, sale of 800 common shares leaving a total holding of 2700 shares; Richard S. Rheem, director, sale of 2000 common shares leaving a total holding of 80,020 shares; William K. Rheem, director, purchase of 2000 common shares, making a total holding of 2802 shares.

● **Sperry Corp.** Thomas F. Doe, director, purchase of 200 common shares, making a total holding of 600 shares.

● **United Aircraft Corp.** Frederick B. Rentschler, director, sale of 100 common shares, leaving a total holding of 14,150 shares.

● **United Aircraft Products.** Robert K. Hert, purchase of 100 common shares, total holding; Metal Production Corp., purchase of 1700 common shares, making a total holding of 30,000 shares; W. Thomas Stark, officer, purchase of 870 common shares, total holding; William H. Wesp, officer, purchase of 100 common shares, total holding.

● **National Aviation Corp.** Frederick F. Rohleson, director, sale of 100 common shares, leaving a total holding of 300 shares.

New-Member Drive Gets CIO Priority

The CIO United Automobile, Aircraft and Agricultural Workers is enlarging the staff of its national aircraft department in order to sign up the increasing number of new workers entering the aircraft industry.

The organization drive is aimed as much at signing up non-members where UAW-CIO already has bargaining rights as it is at obtaining bargaining status in new or unorganized plants.

That is a major reason the union has refused at Douglas Aircraft's Long Beach plant to accept the 6-cent hourly increase the International Assn. of Machinists took at the El Segundo and Santa Monica plants last August. UAW-CIO wants to reopen the two year contract and get a union shop at the same time.

UAW-CIO, claiming 49 percent of the organized workers in aircraft, expects to pass the IAM in aircraft membership if it wins a bargaining election to be held soon at Grand Central at Tucson. Other UAW-CIO organization drives, according to a convention report are in progress at Northrop Aircraft, Whittaker Aircraft, Saval Aircraft, McCullough Motors and AiResearch at Los Angeles among Ryan Aeronautical's office and technical employees at San Diego, at Douglas Aircraft, Tulsa; Pratt & Whitney, Southington, Conn.; and Avco, Bridgeport.

Nav Group Folds as Key Men Resign

Committee leaders quit in protest over loss by RDB of control over electronics research and development.

By F. Lee Moore

The Defense Dept.'s Research and Development Board now has no visible means of control over aircraft electronics research and development done by the Air Force, Navy and Army. Protesting this fact, several key men on the RDB Navigation Committee have resigned, causing the committee to fold.

Now the entire Research & Development Board structure is being reorganized, but this is as yet in the planning stage. The RDB plan is to do away with the "committee" set-up and replace it with a stronger organizational structure—perhaps on "administration" lines. But until RDB Chairman William Webster, Deputy Secretary of Defense Robert Lovett and other top Defense men decide on the new RDB set up, there will probably be no navigation committee.

And until or unless this situation is corrected by the Defense Department, the avionics industry will probably have to cope with more interservice rivalry, more specification changes, to meet individual service desires, and more research, with less production.

RDB control meant that research-to-production schedules were integrated for the greatest national interest, according to top-command strategic planning.

►**The Brass Leaves**—RDB Navigation Committee Chairman H. R. Skifter has returned to his presidency of Airborne Instruments Laboratories. RDB Nav Committee Executive Director William Merchant has shut up shop at RDB and gone on a temporary mission at the Munitions Board. Air Navigation Development Board Director of Development Douglas Ewing has submitted his resignation to RDB Chairman Webster and is going back to Radio Corp. of America as assistant to the director of research.

Ewing's two top electrical engineers—Norman Caplan and J. Wesley Leas—are also quitting ANDB, probably in June. Leas will be coordinator of government projects at RCA Victor division. Caplan says he is quitting government work but hasn't yet accepted a new position.

Most of the top men who have quit RDB recently state that RDB is now impotent. Reason: Defense Department has lost control over much Navy, Air Force and Army research and development (now budgeted at over $1 billion a year).

Some RDB resigners took issue with Chairman Webster for not raising a fuss at Defense about the services' disregarding RDB. The Unification Act of 1947, amended 1949, gives RDB positive control over the services, through Defense Department. RDB, like Munitions Board and Joint Chiefs of Staff, is under the Defense Department, answering only to the Defense Secretary and to the President.

Chairman Webster has started the big fight for RDB reorganization, reportedly threatening to resign unless RDB gets the backing that former Defense Secretary Forrestal gave it. Deputy Defense Secretary Lovett is reporting becoming acutely aware of the drift away from unification of many R&D affairs.

Until Feb. 12 the RDB Navigation Committee controlled almost all aircraft guidance research and development—including non-tactical and tactical radar, radio, navigation, traffic control, automatic flight and landing. On Feb. 12 the committee folded for lack of membership. Now its field apparently is not coordinated by anyone.

The Nav Committee was one of three RDB committees dealing directly in avionics. Other two are Missiles Committee and Electronics Committee, both still in existence. Electronics Committee deals generally with more pure research. Missiles and Navigation are devoted to applied research and development—one to pilotless, the other to piloted air guidance.

►**"No Comment"**—RDB Chairman Webster has said "no comment," since March, to AVIATION WEEK questions like "Is there still a navigation committee?", and "Have some of your top electronics men been resigning lately?"

Last week the Chairman's office took a new tack—hid behind its "security" cloak—and refused to release even the names of the former members of the now-defunct committee. Fact is, the committee members' names are published in public documents and magazines (including AVIATION WEEK Feb. 27, p. 72). While RDB brass said "No comment," other top RDB spokesmen told AVIATION WEEK, "Things here are in flux." Some said "RDB morale is low."

Meanwhile, Navy Bureau of Aeronautics which helped scuttle RDB and ANDB control over service R&D avionics, was dismayed to find such favorite projects as "antenna research" and "propagation research" without funds. This is because, in violation of the Unification Act, the Navy, Air Force, Army and CAA axed the ANDB

ultimate system program. A few electronics R&D men at Navy BuAer and CNO, one of whom has since taken a job with Federal Telecommunications Laboratories, recently sold the Navy on an experimental navigation system entirely different from the "common system" now in development stage, the fight over this divergence contributed to the coolness toward RDB.

▶**How It Happened**—The RDB Navigation Committee, from the Unification Act of 1947 to Korea, kept the services' aircraft avionics projects coordinated. It delegated the non-tactical 'common system" program to the AF-Navy-CAA Air Navigation Development Board, which it sired.

The RDB Nav Committee, like ANDB, molded piloted aircraft guidance as an integrated program. RDB and ANDB killed duplicating projects, sponsored new projects—created a program out of a sprawling list of projects.

But when the services and CAA got their fiscal 1951 budgets, born of the national emergency, they ducked RDB and ANDB control. The services ignored RDB. Certain officers of the services and CAA asked and prevailed on the Defense Department high command and Congress to kill the ANDB fiscal 1952 program, ostensibly to avert a glut of R&D lab facilities. They bypassed the Research and Development Board on this, contrary to provisions of the law.

While ANDB lost control of non-tactical "common system" avionic development by the services, the RDB Nav Committee lost not only that but also its own legal control of all other piloted aircraft guidance research by the services.

RDB Chairman Webster failed to go to bat with Deputy Defense Secretary Lovett, many participants say. So the three key men at the Nav Committee and NADB quit. As the RDB committee disbanded, Nav Committee member and ANDB Chairman Ralph Damon reportedly asked Lovett to save the program. Lovett reportedly asked the Army, Air Force and Navy for an explanation. The agencies apparently stood pat on their original move to take over from ANDB. The RDB Nav Committee died.

RDB Chairman Webster hasn't said a public word about the Nav Committee since he let it fold. But now RDB brass admit he's hurrying a new plan. Reasons for haste: resignations, growing industry unrest, AVIATION WEEK's articles, growing Budget Bureau interest.

▶**Panels Gone Too**—One of the Nav Committee's most vital panels was the "self contained navigation panel"—meaning such things as airborne radar, computers, and gyros. A brilliant list of industry researchers got together here frequently to pull ideas, plans and models out of the brain hat.

In one instance, an aircraft gyro expert showed off a new gyro research project his company was working on. A bright Navy Air member took it to the Navy submariners, who shortly let a contract on it.

With the folding of the Nav Committee, its panels folded, too. Such panels need permanent staff work to exist.

So the RDB Guided Missiles Committee asked RDB Executive Secretary Walker to transfer the self-contained navigation panel to it. Permission for the Missiles committee to take over the panel was denied. The group no longer meets.

What a Guy Sees From a Jet...

Alpheus W. Jessup, McGraw-Hill World News correspondent, has been covering the action in Korea for AVIATION WEEK *since the start of the campaign last summer. The following letter to the editors indicate why his on-the-spot reports have been of such interest and value.*

"The Gentleman from Mars on the right of this picture is yours truly. I had just come back from a combat mission in a T-33, Lockheed's jet two-seater. Just off my finger tips on the wing you can see a little scar. We got holed by a .50 cal. machine gun on the pull-out from a strafing pass at some Communist troops on a road northwest of Yongwol.

"The interested pilot is my special jockey, Lt. Col. Charles H. 'Squire' Williams. Together we think we set a new record for human flesh loaded in a T-33. Squire tops 230 and I'm only an ounce under 200.

"We went up to take a look at an attack mounted by a flight of F-80s. I wanted to find out a couple of things. What a guy sees from a jet and the effect of napalm. As an old observer, I see no great drawback to the jets. From what I observed of the pilots, the well trained, well briefed, and oriented pilot has no difficulty picking up his target area and picking out his targets from the jet. Speed does make a little difference, but the 80s (T-33 is the same practically) have a cockpit from which it is easy to observe, flight is steadier and there is no whirling prop.

"After napalming and rocketing some houses in a couple of villages, our flight leader spotted some troops walking along a nearby road. He went down in a strafing run, knocked off a few, drove the rest in the ditch. As Squire and I came up and around, I spotted fuel streaming over the wing from the holes in the leading edge. Some rascal apparently just stuck a .50 up in the air and pulled the trigger, and we went right through it. But as the saying goes out here, it was 'no sweat' home."

GE JET modification center reworks engines from nearby aircraft companies, and . . .

CONDUCTS CLASSES on J 47 for industry personnel and visiting Air Force mechanics.

GE's Maintenance Monitor Plan

Aircraft gas turbine problems detected and solved faster in engine manufacturer's own overhaul shop.

By Thomas M Self

A project to prove that jet engine builders can catch trouble and improve their product much faster if they are permitted to monitor the service life of their own engines has been started by the General Electric Co

GE has set up a Modification and Service Facility for Aircraft Gas Turbines at South Gate, Calif., near Los Angeles Mainly the shop reworks procurement engines from nearby aircraft companies—principally North American and Convair

The turbine shop sets them right and, after an operational test sends them back to government warehouse stock In addition, the shop performs standard modifications such as the replacement or addition of accessories incorporating the latest changes in design, and so on

▶ **Both Benefit**—Some advantages of this procedure are obvious The Air Force doesn't want to turn a zero-time engine over to its maintenance shops for modification, and local handling of minor adjustments or modifications saves the government money A J-47 crated for shipment to GE's production plants at Lynn, Mass., and Lockland, O., weighs approximately 4000 lb

On GE's side is the valuable knowledge it gets by maintaining a few of its own engines The technical evaluation of service life of the engine on a continuing basis would be an important gain, General Electric engineers tell AVIATION WEEK.

Therefore, GE will propose that the Air Force permit GE engineers, in collaboration with USAF, to monitor at the GE facility on a sampling basis—say two out of every 100—engines up for Air Force maintenance

With the tremendous production of engines for the armed forces such a plan is vital, GE spokesmen say. Otherwise, a manufacturer might build potential trouble into several hundred engines before it was spotted An added reason is the entry of automobile manufacturers into the field of jet engine building

▶ **Still Growing**—General Electric set up its modification and service facility over a year ago. Now it has made the depot a permanent installation, and soon will expand it with an additional 20,000-sq. ft building Also, the company will build its own jet engine test stands Previously it used North American's test facilities

So far the South Gate turbine shop is the only civilian depot of its kind in the country.

But GE plans to install others at important aircraft centers, looking forward not only to more military work, but to repairs of civilian aircraft jet engines when airlines are jet powered

So vital has the turbine shop proved to both GE and the Air Force that the three sponsors have been awarded GE's highest honor, the Charles H Coffin award They are Wayne H Allen, aviation engineer; James L Ghilson, foreman of the modification service facility, and Wilson Davidson, superintendent of GE's western distnct service shops

To date, the South Gate shop has serviced several hundred jet engines Most of them were Air Force procurement J 47s, previously delivered by the Air Force to North American Aviation, Inc., for F-86 Sabres The engines thus were drawn from and delivered to North American government furnished parts warehouses A few engines were received from out-of-state Air Force depots

Also, the plant has worked on engines used in experimental aircraft or in accelerated test programs, plus special units modified for research and development programs at Edwards AFB

▶ **Lessons**—In a little over a year, GE has learned enough tricks to convince the company that Air Force technical evaluation of engines can be speeded up if an engine maker is permitted to perform some of his own maintenance and modification in sufficient quantities to actually monitor the service life of engines

For example, on a single modification job, Ghilson's staff was able to cut manhours in half after working over only a few engines This rate was maintained through several hundred engines

Additionally, the shop has made sig-

nificant contributions to the J-47 tooling program. About 25 suggestions have been subsequently adopted by the Navy and the Air Force. One example, a tool Chilson and his shop designed for removing the center section of a J-47 cut the manhours required for the job by about 50 percent.

In another case Chilson turned out a tool to measure the radius of compressor blades, which eliminates the old, elementary method of using modeling clay. Bushings of pre-determined heights are attached to a rod so that all rows can be checked at the same setting. A depth micrometer gives an accurate reading. Time for the checking job thus is reduced from 1½ hr. to 12 minutes.

▶**Help When Needed**—The turbine shop employs 25 skilled people and gets additional help from GE's Los Angeles office, which has about 75 technical engineers and service shop employes specifically assigned to aircraft activity.

The jet engine shop also has access to the Los Angeles office's modern service shop. Included in the facilities is a GE Thearle type dynamic balancing machine which will accommodate rotors weighing up to 8000 lb and in sizes up to 6 ft in diameter and 9 ft. long.

This analyzer is so sensitive that it will disclose rotor unbalance within 20 inch-grams, which makes it highly suitable for aircraft gas turbine dynamic balance requirements.

An important activity of the turbine shop is a J-47 training school which Chilson has set up after hours. It operates on a continuing basis for the benefit of the operating personnel, new personnel, and potential field service engineers.

In addition to these activities, classes from North American and transient Air Force personnel from March Field AFB and Kirtland AFB are accommodated.

Civil, Military Work Boosted by Bendix

Huge, sprawling Bendix Aviation Corp. (15 divisions; two subsidiaries, including one in France, three affiliates, including two in France) recently gave the public a glimpse at how it has been doing on the Administration's "guns with butter" mobilization defense program.

According to the fiscal 1950 figures, the Bendix production complex gave U. S. civilians plenty of "butter"—a good $5 million more than fiscal 1949's $40 million—plus $11 million more in automotive products than the previous fiscal year's $55 million.

But in selling aviation products, Bendix really had something to show. Here sales for fiscal 1950 (ending last Sept. 30) hit $105 million compared with fiscal 1949's $85 million, 49 percent of the corporation's total volume. When it came to discussing future operations, President Malcolm P. Ferguson terms them "staggering." Military backlogs, which about a year ago stood at $170,463,312, had recently zoomed sharply to over $475 million. To insure that the corporation would be capable of taking on this program, covering hundreds of products from gun charging switches to radar sets, Bendix has already started to:

- **Construct a large test site** at the Baltimore Radio division, Towson, Md., to handle heavy radar equipment; also addition of over 50,000 sq. ft. for expansion of radar and communications production and construction of a high-bay plant area for assembly of large radars.
- **Lease two large factories** in Baltimore for expanded radar output.
- **Rent a substantial production area** near the Eclipse-Pioneer division, N. J., for increased aircraft instrument autosyn production.
- **Rebuilt sections** of Eclipse Machine division's facilities at Elmira, N. Y.
- **Prepare the 155,000-sq. ft.** former Victor Animatograph plant in Davenport, Iowa, for immediate expansion of production facilities for Pioneer aircraft instruments.
- **Purchase a 175,000-sq. ft.** plant in Hamilton, Ohio, from Ford Motor Co. to take care of expanded output of fuel injection pumps and associated aircraft equipment.
- **Purchase 100,000-sq. ft.** plant in Indiana to accelerate guided missiles work.
- **Build 35,000-sq. ft.** plant at South Bend, Ind., to expand aircraft strut manufacture.
- **Rent 50,000 sq. ft.** near the Pacific division in North Hollywood, Calif., to handle increased work on new products including the components of guided missiles.

All of Bendix' expansion is keyed to a plan of geographical dispersion, as is development of numerous alternate sources of supply.

Employment has gone up to 32,400 recently, compared with 22,000 working before outbreak of hostilities in Korea.

Earnings for the first quarter of the current fiscal year dropped, in spite of the firm's higher shipping volumes, to $2,578,457 from $3,798,919 for the first quarter of last year. Net sales for the quarter were $67,044,705, substantially higher than the $52,379,209 of the comparable period last year. Factors in the change were higher payroll costs including new insurance and pension plans and the big plant expansion program.

What Has Been Learned Flying the B-47

Engineering test pilot reports on design, performance considerations of plane, and how they were fulfilled.

The "brute force approach" paid off in Boeing's B-47 Stratojet flight test program, reports R. M. Robbins.* And he should know, because he flew the XB-47 as engineering test pilot on its first flights, and later became assistant project engineer for the airplane.

In his presentation Robbins spoke of the brute force approach as that kind of philosophy which required that positive control be obtained over all flight characteristics even at the expense of some mechanical complication. The evidence he gave of the B-47's flight abilities emphasized the correctness of Boeing's approach.

Major portions of the Boeing report follow.

The principal purpose of the B-47 experimental development, was to prove that high overall performance could be obtained in jet bombers, and that the flight characteristics would be such that the airplane could be considered entirely satisfactory for tactical use. By so doing, the likelihood of early acceptance as a production airplane would be enhanced.

▶**Bomber Background**—Early design studies of the B-47 showed that performance goals could be obtained best with a sweptwing design, using six of the currently available engines. The B-47 has a high aspect ratio wing for long range. Engines are arranged to give minimum influence on wing limiting speed, low fire vulnerability and to provide easy access for maintenance. The engine arrangement was also designed to have favorable effects on stalling characteristics, flutter speeds, and longitudinal stability. Control surfaces are conventional in both their size and travel.

One important point affecting the program was that the main goal was to prove out the swept wing jet bomber. Initially, it was not felt desirable to use the project primarily for developing minor items to a point of maximum effectiveness, minimum weight and simplicity, which are the ever present detailed objectives in airplane design. The reason was that such extraneous developments might delay the primary program. Therefore, the attitude was adopted that positive control would be obtained over all flight characteristics, even at the expense of some mechanical complication.

Control surface operation has always been a problem, as evidenced by the long flight test programs necessary on many successful airplanes. Due to the unknown variables affecting control surface hinge moments at high Mach numbers, all three controls are operated by irreversible hydraulic servos with artificial pilot feel and centering. If there is a failure of the power control, emergency operation is provided through conventional cable controls, assisted by internal aerodynamic balancing.

▶**Low-Speed Control**—The large dihedral effect of swept wings at slow speeds was shown in windtunnel tests to be a possible source of difficulty, particularly on cross wind landings. The satisfactory solution on the B-47 was the use of a powerful lateral control with flaps down. A flaperon provides this control by partially retracting the outboard section of the flap as up aileron is called for on that side.

Another special design arrangement affecting flight characteristics is the tan-

* "Flight Characteristics of the Boeing B-47 Stratojet," R. M. Robbins and W. H. Cook, prepared for delivery at the SAE National Aeronautic Meeting, Apr. 16-19, 1951, New York City.

DRAG CHUTE compensates for lack of propeller reversing in Stratojet landings

dem, or bicycle landing gear. This developed from numerous studies of internal arrangement. Neither jet nacelle nor wing is big enough to house a main gear for the B-47. Therefore, a gear retracting within the body was necessary. A tricycle gear meeting this requirement has several disadvantages when applied to the B-47. It makes for a poor internal arrangement because the main gear must be near the CG, and when retracted in the body is in the same place it would be desirable to put the bomb load. Also the tread would be narrow, giving poor protection to the wingtips. The aft location of the rear gear affords increased protection to the tail and wingtip in a nose high landing and the wide outrigger tread provides good lateral stability.

►**Pilot Training**—Because of the many new design features, unusually extensive pilot training and preparation were followed for safety on first flights. Jet engine familiarization was obtained with a General Electric gas turbine mounted below the bomb bay of a B-29 flying test bed.

Additional familiarization with jet engine and airplane operation was accomplished by flying F-80s, courtesy of the USAF. F-80 takeoffs using JATO bottles supplied by Aerojet were a part of this program.

The typical flat landing approach of jet airplanes is, to a large extent, the result of high idling thrust of jet engines and lack of propeller windmilling drag. In addition to F-80 experience, this characteristic was simulated on several landings in a B-29 by having the co-pilot operate the engines at the proper rpm with the propellers in fixed pitch to give the same thrust as the jet engines. Partial flap extension was used to simulate the stalling speed of the B-47. Essentially the same weight and braking were available as on the B-47. It was found important that the correct approach speeds be maintained and that by so doing emergency landings could be made on moderate length fields if required. At this time neither the drag parachute nor anti-skid device had been developed.

Low speed characteristics of the elevator and rudder were investigated in the NACA's 40 x 80 ft. windtunnel at Ames Laboratory with a set of tail surfaces from one of the experimental airplanes built on a short afterbody. Pilots found that with power controls, operation was smooth and light, and that emergency operation with power controls inoperative was heavy but adequate.

Ejection seat indoctrination was arranged by USAF Air Materiel Command at Wright Field. Bicycle landing gear experience was obtained in "The Middle River Stump Jumper," a B-26 modified by the Glenn L. Martin Co.

In this actual experience was added a considerable amount of familiarization with the B-47 systems, performance, emergency endurance and range procedures. With the conclusion of the thorough ground and taxi tests which were conducted on the first B-47, the pre-flight training was complete.

As a result of this experience the flight characteristics were found to be as expected, although in some ways different from on past bombardment types.

►**Pilot's Office**—The cockpit arrangement gives the pilot exceptional visibility over the nose, on both sides, above and aft. Flight controls are conventional and have a large mechanical advantage for emergency operation with power servos off. The throttles are clustered together for easy grip by one hand. The instrument panel has the standard flight group and engine instruments. The fuel panel is of the diagrammatic type, with gages, valves, and warning lights functionally indicated and located on the diagram.

First impressions may be that the pilot is impossibly overburdened by six engine operation. However, several factors show this to be otherwise. Each jet engine is operated by only one lever affecting power, as against four controls on the reciprocating engine propeller combination. In addition, the two or more controls on various cooling air outlets are all absent on jet engines. Standard systems have been designed to require a minimum of attention on the part of the pilots.

The co-pilot has a similar arrangement and in addition has control of the electrical system, emergency landing gear and flap, and other equipment normally not requiring operation. The co-pilot's seat is elevated above the pilot's

to improve vision. Landings are possible from the co-pilot's position, which aids in training.

►**On the Ground**—The B-47 is very easy to taxi. After it is started rolling by a short period at moderate power, idling thrust is sufficient for taxiing. Turning at low speeds can be made on a very short radius and is accompanied by a noticeable heeling over. Steering is entirely by a nose wheel controlled by rudder pedals. This arrangement was found to be most natural and convenient, since differential braking is not available. Differential power on the outboard engines is not used. At moderate taxiing speeds the pilot can roll the airplane slightly with the ailerons, compressing the soft outrigger oleo struts.

Takeoff is accomplished in a normal manner. Pre-run up of engines is not necessary, as a power check can be made during the first part of the roll. Due to the large fore and aft spread of the tandem gears, the pilot has virtually no control over the attitude on the ground. This arrangement has been found entirely satisfactory, and prevents the pilot from varying the unstick speed as is frequently done improperly when he can rotate the airplane on the ground. Ground attitude was selected for optimum takeoff speed, considering takeoff distance and performance after takeoff under emergency conditions.

Takeoffs are made with full flap. At the unstick point the airplane flies off the ground with the elevator near neutral, very similar to the B-17 or other tail wheel airplanes of low ground attitude.

One important point on takeoff is the comparatively long ground run, particularly on hot days. This is due to the constant thrust characteristic of jet engines as well as the fact that the great power of the jet engine in flight permits high airplane loadings. However, once airborne the critical emergency characteristics so notorious on overloaded reciprocating engine airplanes are much better on a six-engine jet airplane. Once in flight, things get better in a hurry on the jet. The B-47 pilot can and should predict his takeoff run and critical points to permit optimum emergency procedures. It is believed that developments in engine augmentation and improved rocket assist will aid considerably the critical hot day problem. For the present, solid Rato provides extra takeoff thrust. Directional control with unsymmetrical power is not critical, in spite of the apparent large moment arm of the outboard engine.

During cross wind takeoffs a large amount of aileron control is required to keep the B-47 laterally level. In addition, the drift of the airplane (at speeds appreciably below takeoff speed) is very noticeable because of the difference between the airplane's heading and track down the runway.

In general, the feel of the B-47 on takeoff is very similar to that of a flying boat.

►**In Flight**—After takeoff the gear and flaps are retracted, in that order. The speed of flap operation is such as to match the accelerating characteristics of the airplane. During flap retraction a retrimming device prevents any change in trim, so that longitudinal trimming is not required until best climbing speed is reached. Particularly appreciated on a refused landing is the negligible effect of power changes on trim.

One new characteristic of jet airplanes is the very high speed for best rate of climb, as well as the high maximum rate of climb. Where terrain permits, this results in a low angle climb during acceleration, followed by a steeper and rapid climb to the high altitudes desired for cruising. Where required for clearance reasons, steeper angles can be obtained at the expense of efficiency by holding the speed down since engine cooling is not a problem.

Means for providing artificial control feel were designed to give the characteristics of ideal aerodynamically balanced controls. The elevator and rudder forces per unit of control deflection increase in proportion to the dynamic pressure. Ideally it would be desirable to give the pilot light controls for easy handling, yet heavy enough to protect the airplane structure from excessive loads. This cannot be achieved without compromise, except by such things as "G" limiters, which are questionable at this time. However, with artificial feel the forces can be set to suit the majority of pilots without a tailoring flight test.

The new pilot will find the forces on the B-47 pleasantly light. Normal control coordination is required. Rates of roll which are fairly spectacular, compared to past bombers, are particularly evident to the pilot because the aileron forces are very light, the only force being that for centering.

►**Stability**—The characteristics of an airplane in rough air tend in the long run to have more eventual influence on a pilot's opinion than some of the more spectacular phases of flight. Longitudinally the B-47 is very much less disturbed by turbulence than non swept-wing bombers. One of the characteristics of swept wings is the load-relieving tendency of the wing tips. The B-47 wing is unusually flexible, during positive and negative wing static load tests, the wingtip traveled 17½ feet. In rough air this wing flexibility is quite apparent. The pilots can see the wingtips and outboard nacelles riding the bumps while the cockpit is riding smoothly. B-47 pilots when radio-talking to pacer airplanes have found that the B-47 was riding considerably smoother than its companions in stiff winged fighters under the same rough air conditions. This characteristic will also provide passengers in future military and commercial jet transports with a more comfortable flight. It is of prime importance in the B-47 as it provides a more stable bombing platform.

Damping of the longitudinal motion following a gust is high, with no visible short period oscillations.

Laterally, the airplane is much more disturbed by gusts. Early in the flight tests it was found that under some conditions a dutch roll oscillation would die out slower than desired. Where many conventional airplanes have a yawing oscillation following a side gust, the higher dihedral effect of swept wings causes a coupled rolling, which is objectionable to pilots. By applying a small corrective motion to the rudder, using some autopilot developments in what is called a yaw damper, these oscillations can be damped as well or better than in conventional straight-winged airplanes. The B-47 pilot can use the yaw damper as desired, although nothing is required from the standpoint of safety.

►**Stall Behavior**—Abrupt stall rarely exists on a swept wing, furthermore, stall warning on swept wings is usually more pronounced over a wider speed band. Because of this there is little excuse for inadvertent extreme stalls.

Most large airplanes which do not limit the amount of elevator control have rolling tendencies in the extreme stall. This is also true on the B-47. However, powerful lateral control is available, and in stall tests the pilot was able to hold the wings level by rapid control movements, the wing getting down to 30 degrees in only a very few instances. During an extreme stall there is so much buffeting in the B-47 that it is hard to conceive of this small amount of roll having any practical significance.

Pitching in a full stall is mild. No loss in altitude occurs on approaches to stall warning when followed by proper recovery. A large loss in altitude does, of course occur on complete stalls.

Slats were provided on the prototype as insurance but, because of the good stalling characteristics that exist without them, are being eliminated on production airplanes. Removal of the slats will save approximately 600 pounds and simplify maintenance and manufacture of the B-47. The slats are typical of a feature incorporated so that positive control of the airplane's characteristics would be assured—the brute force approach. This one proved unnecessary.

►**Landing Techniques**—By far the most training of jet pilots must be spent on

the landing phases. This is due to several factors:

- **Very high level-flight speed** requires a longer time for the airplane to slow down.
- **Higher wing loadings** possible in jet airplanes and the somewhat lower wing maximum lift result in higher stalling speeds.
- **Absence of reverse thrust,** and the deficiencies of present jet engines, make the airplane respond like a conventional propeller type with the idle stops set too high.

Rapid descents from altitude are made with the landing gear down. The flaps are put full down in the landing pattern (which is slightly wider than for B-29 airplanes). On final approach the pilot must maintain the desired airspeed carefully to avoid using excessive amounts of runway and to maintain an adequate margin above the stall.

One disadvantage of tandem gear is that the speed range in which smooth landings can be made is more limited than on other types. The airplane cannot be landed at a speed much higher than that for simultaneous contact of both gears. Touching the front gear first with an appreciable rate of descent will result in a bounce back up in the air, or will at least prevent enough load being applied to the wheel to permit effective braking.

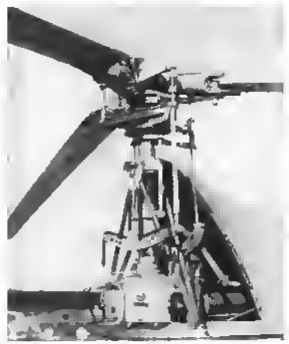
Usually on contact the pilot releases the drag chute. This device will save many otherwise impossible landings. A parachute would be a very good emergency device on all large airplanes, regardless of type, and costs comparatively little weight.

In addition to the parachute an anti-skid device has been developed by Boeing which is also a very worthwhile improvement to the original XB-47 configuration. More consistent stops with far less tire wear are possible under all conditions with the anti-skid device.

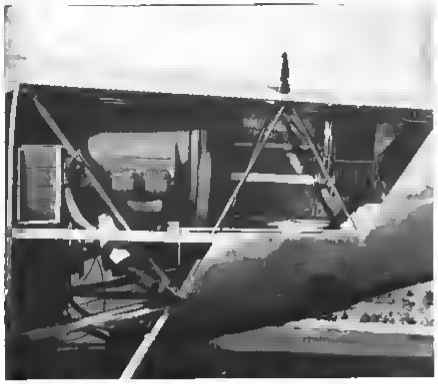
From the test pilot's standpoint the jet airplane has many advantages. The simplicity, lack of vibration, smooth ride in rough air and comparatively low cockpit noise level are obvious advantages. The ability to get the airplane in the air regularly in early flight tests without prolonged testing of propeller stresses and the usual power plant problems is an obvious advantage that was most welcome in the B-47 flight test program.

In tactical operation these same advantages will be present to a varying degree and lead to the conclusion that if the jet airplane can be made to do the range job (and there are many places where it can) it certainly offers many advantages. The successful in-flight refueling of a B-47 has appreciably increased the number of missions which the airplane can accomplish.

MC-4 IN FLIGHT shows lines which bear resemblance to earlier craft of the designers



FORWARD rotor is driven by bottom shaft.



ENGINE is mounted horizontally, belt drive at right turns shaft.

COCKPIT VISIBILITY is good, as are chrome appointments.

McCulloch's MC-4: Cheap But Chic

Navy has two on order for evaluation; first run of ten planned.

That reddish color in the night sky around Los Angeles is not only from downtown neon—part of it is the glow of optimism around the McCulloch Motors Corp. plant.

Cause of all the enthusiasm is McCulloch's brand-new MC-4 helicopter (AVIATION WEEK Mar. 26, p. 18)—a twin-rotor, two-place craft with a chrome-decorated boudoir-interior that is straight out of Detroit.

And concurrent with the announcement of the copter, Pres. Robert P. McCulloch indicated that his company has jumped feet first into the deep water of the helicopter business.

FROM BELOW, MC-4's clean lines are more apparent, as is upward visibility from cabin.

McCulloch MC-4

DIMENSIONAL DATA

Gross weight	1400 lb
Empty weight	1255 lb
Useful load	000 lb
Max. length	20 ft. 6 in.
Max. height	9 ft. 1 in.
Rotor dia.	22 ft. 0 in.

PERFORMANCE DATA

Max. Speed, S. L.	100 mph
Hovering ceiling	6500 ft.
Service ceiling	10 000 ft.
Vert. rate of climb, S. L.	675 fpm
Max. rate of climb, S. L.	1520 fpm.
Time to climb to 10,000 ft.	9 min.
Cruising range	265 mi.
Endurance	4¾ hr.

To back up his claim, McCulloch showed off a new 75,000-sq.-ft. facility for the newly constituted Helicopter division, and extra construction to the extent of 250,000 sq. ft. in the main plant area which will absorb the overflow of copter production, if and when.

What with one thing and another, it looks as if McCulloch has taken a mighty big bite. Chewing and swallowing may be something else again.

▶**Accent on Youth**—The company is young and energetic, as are its six officers—they average out at about 35 years apiece. Five are engineers, four have been, or are, licensed pilots. The "old man" is 39.

McCulloch was organized as a corporation in 1936 to produce superchargers. Seven years later, McCulloch Engineering Corp. was sold to Borg-Warner for one million dollars.

In 1943, McCulloch Aviation, Inc. was formed to produce and design gasoline engines. And about this time, the company began long-range research on helicopters.

The present MC-4 is the product of two years of work by the company and the experience of the Helicopter Engineering Research Corp., engaged by McCulloch in 1949. Brains of the HERC are Pres. D. K. Jovanovich, designer of the JOV-3 copter (which could be considered as the experimental model of the MC-4) and Vice Pres. Frank Kozloski, who worked on Kellett's XR-8 and Piasecki's XHRP.

Cost-cutting has been one major objective in the MC-4 design, and the designers are to be congratulated in making a low-cost vehicle which still has a sleek appearance and a custom-styled interior.

▶**Powerplant**—The engine is an Air-cooled Motors 165-hp. type, mounted horizontally with output shaft in the same attitude. A ten-unit V-belt drive connects the engine to the main drive shaft which runs overhead the length of the fuselage. A simple idler pulley engages the drive shaft for flight; clutch

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39,600 ft/eng/min.

39,600
110 engines actually in use/min
4,168,395 total fleet ft/min.
789.4 miles/min
5280/4,168,395.

has been eliminated. Main shaft to rotor connection is through automotive gearing and bearings mounted in a special alloy housing at each rotor.

Rotors are fabricated by wrapping Dural skin around a leading edge extrusion and bonding with a special adhesive. Pregwood forms the trailing edge, but may be eliminated, the blade is already overstrength. This method makes rotor blades cost about $3 per ft, or somewhere around $30 per blade.

Detailed plans for production of the MC-4 are waiting on orders. And right now, McCulloch has firm orders for only two rotorplanes for the Navy's evaluation. But McCulloch is going ahead to make ten anyway to get some experience in pilot production lots, and to have some to sell just in case.

▶**How Much?**—About $15,000 will get you one of the eight available in the first run. And if production should set in, McCulloch hopes to be able to knock the price down to $10,000 per copy—assuming lots of 100 or more.

NACA Reports

▶**Critical Stress of Ring-Stiffened Cylinders in Torsion (Report 989)—by Manuel Stein, J. Lyell Sanders, Jr., and Harold Crate.**

This report derives a chart for determining the theoretical critical torsional stress of simply supported cylinders, stiffened by identical equally spaced rings of zero torsional stiffness. Comparison of theoretical and experimental results shows that ring stiffened cylinders buckle at a stress about 15 percent below theoretical buckling stress—D.A.A.

▶**Investigation at Low Speeds of the Effect of Aspect Ratio and Sweep on Rolling Stability Derivatives of Untapered Wings (Report 968)—by Alex Goodman and Lewis R. Fisher.**

Knowledge of the stability derivatives of an airplane is necessary in order to be able to estimate dynamic flight characteristics. It is easy to determine static-stability derivatives from wind-tunnel tests, but in the past dynamic derivatives have not been as easily found.

Now NACA has developed techniques using curved- and rolling-flow equipment in the stability tunnel at Langley Field, and is using the techniques to evaluate the effect of geometry on rotary and static stability characteristics of wings and complete aircraft configurations.

Sweptwing theory says that sweep back has no effect on the damping in roll at low aspect ratios near zero. This has been corroborated by the tests which showed that increasing sweep back angle decreases damping in roll only at the higher aspect ratios.

Linearized theory says that damping in roll is independent of lift coefficient, and that yawing moment and lateral force due to rolling are directly proportional to the lift coefficient. This was found by tests to be valid only for a very limited lift-coefficient range when the wings were highly swept. With such wings, the damping increased in magnitude. The yawing moment due to roll changed from negative to positive at moderate lift coefficients.

Wingtip suction is not accounted for by present theoretical means, but it was found to be very important in its effect on yawing moment due to roll. And this effect was particularly important for low-aspect-ratio, swept wings. The report suggests an empirical method of handling this effect.

A method has also been developed which accounts for the effect of drag on the yawing moment due to rolling throughout the lift range—D.A.A.

▶**Blockage Corrections for Three-Dimensional-Flow Closed-Throat Wind Tunnels, with Consideration of the Effect of Compressibility (Report 995)—by John G. Herriot.**

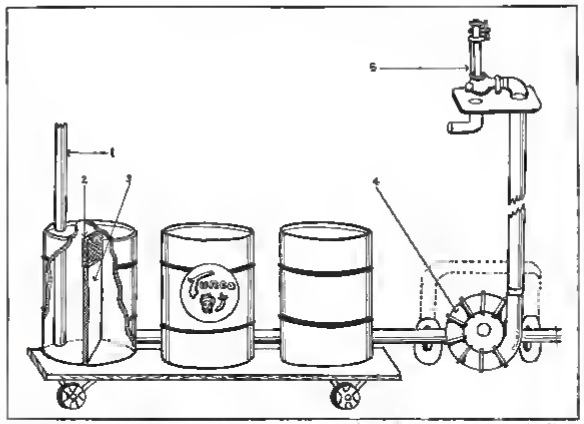
Placing a model in the throat of a windtunnel of closed test section effectively blocks the airflow. The effect is to increase the velocity of the flow past the model. Tests are actually made in a stream of air at somewhat higher speed than free stream velocities measured upstream of the test section.

The observed velocity, dynamic pressure, Mach number and other quantities have to be corrected for these blockage effects. This is generally an individual job which is affected by the shape of the tunnel throat, the size of the model and such. No one report has given the necessary formulas, constants and modifications to calculate any solid blockage case which an engineer may encounter.

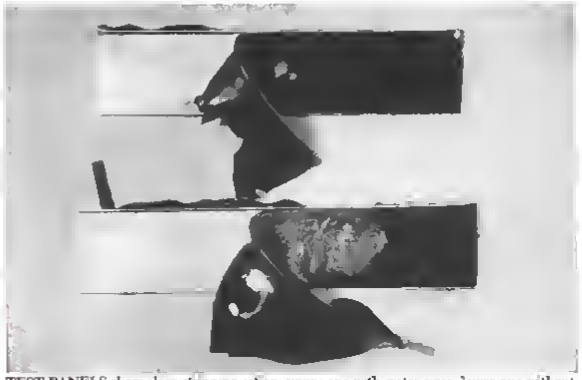
The purpose of this report is to present a summarized and extended survey of the results of all the available literature on the subject. As such, the report is definitive.

Formulas are presented for solid-blockage corrections for the cases of a body of revolution or a three-dimensional unswept wing in a circular or rectangular tunnel. The formulas have two constants, one defining the shape of the body and one the shape of the tunnel and the ratio of wingspan to test section width. Values for these constants are tabulated.

All formulas are given with directions for their use and their limitations. A list of 14 references rounds out the report—D.A.A.



RESERVOIR contains return line (1) from fuel tank being stripped, with wire mesh (2) on baffle (3) to keep sealant from being recirculated through turbine (4) to sprayer (5).



TEST PANELS show clean stripping action, upper one with water rinse, lower one without.

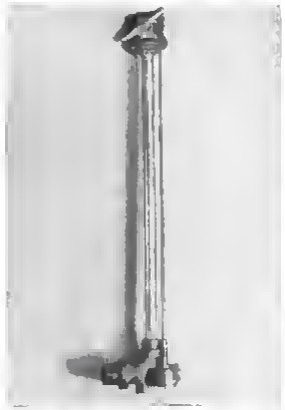
Tanks Stripped Faster and Cleaner

Turco-Pyrate-developed unit is on dummy access door and fits entirely in fuel tank when in operation.

Time and effort spent stripping integral aircraft fuel tanks can be sharply reduced, irrespective of sealant used, by employing a new method developed jointly by Turco Products, Inc., and a new machine designed by Pyrate Corp.

Tom Franzreb, of Turco's technical department told AVIATION WEEK that he estimated one man could strip the tanks on a four tank DC-4 in 16-20 hr. plus another 16-20 hr. for touch up. Franzreb estimated that 400-500 man hours and three men are normally required to do such a job. Immobilization of the aircraft would be reduced from about two weeks to three days. Time to strip DC-6s and Constellations may be judged from the DC-4.

Franzreb pointed out that these figures were conservative estimates based on an actual stripping of a Lockheed



Automatic Tank Washer, nozzle at top

Lodestar recently performed in cooperation with Lockheed Aircraft Service at New York International Airport.

▶**Time-Saving Spray**—These important time and labor reductions in tank stripping are possible through the development of the Pyrate Automatic Tank Washer, through which Turco stripper 2822 thin (AVIATION WEEK June 5, 1950) is squirted under pressure.

The tank washer is an 18-in. long tube with an inlet and turbine at one end and a gear-driven, revolving set of two opposing nozzles at the other. Stationary parts are aluminum, moving parts stainless steel.

The spray machine is mounted vertically on a dummy access door containing both the inlet and outlet lines. The tank's usual access door is removed, and when the dummy door is mounted in position, the stripper is forced into the unit at pressures ranging from 50 to 150 psi. The stream drives a turbine at the base of the machine, passes through the vertical pipe and is distributed through the nozzles in the head. The head is rotated in the horizontal plane by a shaft from the turbine at 10 rpm.

Nozzle, made up of two ¼ in. jets, revolves in the vertical plane and is geared to move 1 deg. for one complete revolution of the head. Any spiral pattern described within a tank overlaps a preceding spiral to insure complete coverage of sealed areas.

The washer is 18 in. long, 7 in. in diameter and weighs 15 lb. Typical discharge rate is 40 gpm. at 150 psi. using two ¼-in. jets.

▶**Ground Equipment**—Ground equipment required for efficient use of the washer consists of a 15-hp. electric or gasoline motor driving a 50 gpm. centrifugal pump at 150 psi. One reser

voir is sufficient for a Lodestar—three are recommended for DC-4s, 6s and Constellations

Drums may be made of aluminum, stainless steel or plain steel with suitable resistant lining. Hose also may be flexible aluminum or stainless steel. Rubber may be used if lined with teflon.

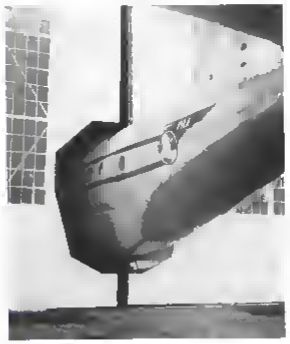
Stripper is pumped from the tank into the spray which is completely enclosed within the tank. A 3-in return line drains fluid from the outlet port in the dummy access door into the drum which is sealed to reduce evaporation to a minimum. A baffle incorporating a double 20 mesh screen in the return drum will help to segregate large portions of sealing material from the main reservoir of stripper.

For larger four-engine planes, a triple unit working in three access doors simultaneously is recommended. Other advantages of this method are now apparent. The single operator need never come in direct contact with the stripping fluid. Since the entire system is closed, no mess is created (and stripping fuel tanks is one of the messiest operations known to maintenance men), no special suits or masks are required. Consumption of stripping compound is about equal to hand spray-on method as is touch up time after most of the sealant has been removed. Hand stripping of heavy pieces of sealant around faying surfaces and angles is eliminated.

Stripping action is by both bond release and dissolution.

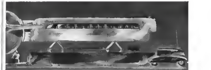
After stripping, water rinse is performed effectively with the sprayer.

The washing unit is manufactured by the Pyrate Co., Bayside, L. I., N. Y. and will be leased by Turco at about $500 a year. Three are now available and more can be made up on demand.

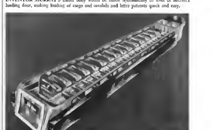


HANGAR DOOR CUTOUT

Cutouts in Pan American World Airways San Francisco hangar doors allow huge tail of Boeing Stratocruisers to protrude from the building while mechanics inside work in comparative warmth and comfort.



INVENTOR MURRAY'S trailer body would be raised hydraulically to level of aircraft's loading door, making loading of cargo and invalids and litter patients quick and easy.



TRAILER BODY would carry passengers; baggage would be in nacelles along the side.

How to Save Time on the Ground

Tractor-trailer could carry passengers and cargo to airport, act as loading ramp and waiting room.

Novel, streamlined tractor-trailer-type buses to carry airline passengers direct from downtown terminals to airplane are proposed by Jerome L Murray, inventor and head of Murwood Laboratories, Inc., 304 E 42 St., New York

Murray's proposal is a new approach to the vexing problem of transporting passengers with a minimum of confusion and loss of time to airports that often are remotely located.

▶ **Time-Saver**—Greatest advantage of the trailers is the bypassing of the airport terminal, with its attendant baggage handling problems, long and often confusing walks, exposure to bad weather and delays. The vehicle would, however, stop at the airport terminal to pick up additional passengers. Murray proposes that the passenger board the trailer at the downtown terminal and be hauled directly to his plane.

Hydraulically extendable, the body of the trailer is raised to the exact height of the ship's loading door. A rear ramp is then run out to the fuselage, limit switches in the rubber manifold stop the ramp as the soft rubber lip seals the opening effectively against the weather. Passengers embark by walking along a level floor, an especial boon to wheel-chair patients or those using crutches.

Baggage is carried in two long nacelles slung on either side of the trailer, and is quickly unloaded with the help of built-in, motorized, reversible conveyor belts, and stowed in the aircraft. The plane, already being parked on an apron adjacent to the take-off runway, need only be put through the pre-takeoff check and taxi a minimum distance (few hundred feet) to takeoff position, an important consideration with commercial jets in the offing.

▶ **Dispersed Aircraft**—Murray points out that dispersal of aircraft possible with such a system would reduce to a minimum the current congestion around terminal loading areas or excessive walking for passengers embarking at airports using the long finger terminal area design. Murray says that Pan American World Airways and Eastern Air Lines told him that they each suffer $2500 to $3000 worth of aircraft damage a month at Miami alone due to taxi mishaps.

If airports were to be built around such a loading system, significant savings would accrue from reduction in size of terminal area because the buses can act as waiting rooms in case of delay (air conditioning, television and toilets would be available in the trailer) while expensive fingers to loading areas could be reduced in size.

▶ **Vital Statistics**—Murray suggests that the cost of 60-passenger trailers would be $12,000–$15,000 if ordered in quantity (200 or more). Three sizes should be available—20, 40 and 60 passenger. Tractors—175 hp. diesel units costing some $5000 to $8000—would be available in the ratio of ⅓ vs. trailers.

- **Trailer detail.** Television and a bar could be included. A large foyer in the rear would serve to hold passenger hand baggage, last minute mail and express, ticket counter and traffic agent who would check in passengers while enroute to the field (saving the time now lost at counter or loading gate).

Vertical limits of body travel are 32 in. from the ground in normal position and maximum extension to a 12-ft loading door sill. Mechanical interlocks prohibit extension of the body unless brakes are locked. Large size loading door (7 x 8 ft.) makes it easy for driver to park trailer next to any type of entrance, front or rear, high or low. Rear ramp can extend a total of seven feet.

The trailer could also be used for carrying cargo and for up to 93 litter patients.

- **Tractor detail.** Cab would have large window areas permitting excellent visibility for driver who would be CAA-licensed to drive on airport. Two way radio provides him with continuous means of communication with the tower for directions and instructions. Small turning radius makes the unit highly maneuverable.

Although no units have yet been made, Murray says many persons have expressed interest in the tractor trailer idea. He believes that the extreme flexibility of the unit, the fact that the cargo and litter patient versions provide such large capacities, will appeal to those interested in town-to-airport haulage.

Murray has a long list of inventions to his credit, including the automatic rain-switch to raise a car top recently shown on General Motors "car of the future."

Douglas Developing Collapsible Lifeboat

A new all-purpose airborne aluminum lifeboat capable of expanding automatically from torpedo size to a length of 20 ft. is being developed by the Long Beach engineering division of Douglas Aircraft Co. in cooperation with the Air Sea Rescue Unit of the Air Materiel Command. Current order is for three experimental units.

Engineers claim advantage of this craft over existing boats is that it would not require special modification of the plane carrying it, nor would it demand a particularly large aircraft. Dimensions of the lifeboat would allow it to be stowed in any plane capable of carrying a 2000-lb. bomb or it could be launched from any torpedo-launching tube.

▶ **Expandable and Versatile**—Detaching craft from its carrier would actuate an electric sequence switch causing the boat to expand to its 20-ft. length in a matter of seconds. The craft could be launched from an altitude as low as 75 ft.

Equipment aboard includes inboard motor and sufficient fuel for 300 miles, remote control radio, automatic pilot, heater, food and survival equipment to last eight men five days.

The lifeboat will be self-righting, self-bailing and designed so it cannot be permanently capsized. Electronic equipment aboard will permit the launcher to start or stop the engine, steer the craft and set it on any compass course—all by remote control. Two way radio for the survivors should hasten location and rescue of personnel.

British Make New High-Speed Tach

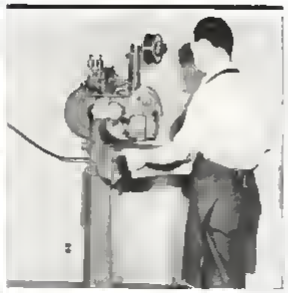
(*McGraw-Hill World News*)

London—A precision tachometer is one of the latest developments of The Plessey Co., Ilford, England.

The instrument was designed at the request of the Ministry of Supply for use by the Royal Aeronautical Establishment for flight testing new engines. The manufacturer says that the new tach can measure shaft speeds up to 20,000 rpm. with an accuracy of 10 rpm. Such precision is important for jet engine operation where overspeeding can be dangerous and close supervision of rpm. is important for fuel economy considerations.

A slotted disc-photo-electric cell combination picks up shaft speed, the indicator unit being remote from the main equipment. Total weight for multi-engine aircraft installation is about 37 lb.

NEW AVIATION PRODUCTS



Parts Staple

A machine designed to bind aircraft sheet metal assemblies together in a manner similar to stapling sheets of paper has been developed by Heller Co.

Called the Heller Power Stapler, the machine is expected by the company to speed production of aircraft by removing the need for riveting or welding some parts. Says Heller, "the stapling process is faster and simpler than riveting and does not require pre-drilled holes."

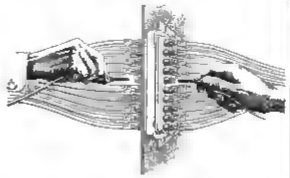
The company discloses the Air Force already has expressed interest. Possible AF use of the tool would be in combat areas—where planes must be patched and repaired quickly with limited shop facilities.

No lightweight, the motorized stapler can plunge wire through 30 gage steel sheets and can handle greater thicknesses of such metals as aluminum. Address: 2135 Superior Ave., Cleveland 14.

Plane Omni Checker

Newest addition to the growing list of ground testers designed to check operation of omnirange and localizer receivers used in aircraft is a test set developed by the radio service shop of Van Dusen Aircraft Supplies, 2004 Lyndale Ave., S., Minneapolis, Minn.

The set was developed by Van Dusen with the aid of the electronics engineering staff of the University of Minnesota, according to the company. It says accuracy of its set in the VOR positions is ±¼ degree. Omnirange receivers can be checked out on any heading by means of a simulated omni signal which is continuously variable from zero to 360 deg. and which is available as audio or modulated RF carrier. The RF carrier, modulated with 90 and 150c audio, is available to check operation of the left, center, right operation of the localizer receiver.



Bulkhead Wire Panel

Electrical disconnect panels for pressurized compartments, designed for easy maintenance, have been developed by Burndy Engineering Co., Inc.

The largest of the type will accommodate up to 100 electrical circuits, each of which can be individually connected or disconnected from either side of the pressurized bulkhead where the panel is installed.

Wire leads are tipped by silver-plated connector pins which can be rapidly inserted into or removed from silver-plated sockets fitted into the pressure-tight phenolic panels. Spring locks in the sockets secure the connector pins firmly in place. Pins can be rapidly indented to the wire leads by means of simple installation tools, says the company. Socket identification numbers are molded into the phenolic on each side of the panel.

Burndy says panels already are "approved in major aircraft installations." Pin and socket assemblies take a "practical" range of conductor sizes and are available in 26-place round panels, 40-, 53-, and 100-place rectangular panels. Thermocouple sockets also can be supplied. Address: 107 Bruckner Blvd., New York 54, N. Y.

ALSO ON THE MARKET

"Ferramic" cores now are available in cup, ring, "E" or "I" shapes. Parts made of this soft magnetic material are extruded, machined or molded at low cost—rather than laminated—by General Ceramics and Steatite Corp., Keasby, N. J.

Horizontal hydraulic boring machine will cut holes ⅜ to 6¼ in. in dia. to tolerance of .0003 in. Produced in 200- and 300-lb. models, machine holds work stationary and only boring tool revolves. Made by Hydro-Borer Co., 1511 W. Florence, Inglewood, Calif.

Silver-clad steel for aircraft ball bearings, electrical contacts and other parts now is available as substitute for brass, copper nickel-silver and other hard-to-get metals from the Rolled Plate division of American Silver Co., Inc., 3607 Prince St., Flushing, N. Y.

We Must Pay As We Go

***We** must do our utmost to pay as we go for our present defense program.*

On that proposition those who speak with authority are remarkably well agreed. This editorial — the second in a series on our mobilization for freedom — sets forth in simple terms why there is this agreement.

Next year — the fiscal year beginning next July 1 — the federal government's budget calls for the expenditure of $10 billion more than is scheduled to be collected in taxes. The deficit is due to the increase in defense expenditures.

A part of this deficit can be eliminated by cutting non-essential expenditures and increasing efficiency in the defense program. There is wide agreement on this. It is the duty of the President and Congress to see that it is saved.

How the remaining deficit anticipated in the federal budget—$5 billion to $10 billion—is handled is crucial. The government can meet it by raising taxes—by paying as we go. Or it can borrow, issuing more government bonds.

Borrow Again?

We relied heavily on borrowing in both World War I and World War II. In World War I only about one-third of the expenditures of the federal government were met by taxation. In World War II about 45 percent were met in this way. The rest we borrowed. Some people ask, why can't we rely heavily on borrowing again? Why is it crucially important to avoid adding $5 billion to $10 billion to a federal debt that is already $257 billion?

Part of the answer is found in the contrast between this defense program and our all-out effort of World War II. Another part—and one that is all-important in combatting inflation—results from the rapid decline in the purchasing power of the American dollar in recent years.

We went "all out" in World War II. We put almost half of everything we produced into our military effort. Taxes high enough to pay the financial costs as incurred would have meant huge tax increases. It was feared that such increases would kill financial incentives to get "all out" production. Since we expected the war to be short, borrowing seemed a safe expedient. Price control and rationing, with wartime patriotism to give them effective support, were relied upon to keep in check the inflationary pressure created by borrowing rather than taxing.

Our present defense program is scheduled to take a much smaller share of our production, but to take it over a much longer period. At its peak, the program as now planned will take only about 20 percent of our total national production. But, to use General Bradley's phrase, "the conditions under which we labor may persist for ten, fifteen or twenty years."

What About Controls?

For a period of any such duration it would be foolhardy to expect that the sort of controls we had for the few years of World War II could hold in check the inflationary pressure created by not paying as we go. It would be as foolhardy as it would be for a family to plan on borrowing to pay the expenses of a member discovered to be afflicted by a chronic ailment which might last a long lifetime. Obviously, the only safe thing to do in such a case would be to adjust the family budget so that the expenses of the illness would be paid currently.

Our heavy reliance on borrowing in World War II had consequences which block a successful repeat performance.

If the borrowing had been done by persuading individuals to transfer their savings into government bonds, relatively little inflationary pressure would have been created. What the government would have spent with the proceeds of such bond sales would have been subtracted from the money individual consumers could spend.

But much of the borrowing was done from banks. That course expanded the amount of money available to the government without any offsetting subtraction of money from the hands of individuals. Thus, when direct price controls were removed after the war, this bottled-up purchasing power contributed to a price inflation which has cut purchasing power of the American dollar about in half — and decidedly changed the attitudes of the American people toward that dollar.

During World War II, Americans in general believed that

- The war would not last long.
- The dollar would hold its value, and even gain value after the war.
- Many wonderful new products would be available in the postwar period.

Today the American people have

- Seen the value of their dollars melt away fast.
- Been assured that, at best, we may have a 10-15-20-year pull ahead.
- Been warned not to expect a postwar paradise anytime soon.

One result of these changed attitudes is a notable lack of enthusiasm for government bonds on the part of individual investors. This is indicated by the fact that since Korea redemptions of E bonds have exceeded sales by about $600 million. Another result is a continuing rush to convert dollars into physical goods and equipment or claims on them. This trend weighs against financing the prospective federal deficit by borrowing from individuals.

Borrowing from banks to meet the deficit would again add fuel to inflation.

The prospective deficit is due to federal expenditures for military goods. Even if they are not blown up or shipped abroad, these goods will not be available to civilians. But the money paid to those who produce military goods will still be available to bid up the prices of civilian goods. Thus, at a time when people show relatively little disposition to save dollars, a menacing inflationary pressure — an inflationary gap, the economists call it — will be created.

If our fight against inflation is to be successful this gap must be closed by taxes. We need to do other things, too, for inflation has many different causes. Credit expansion must be effectively controlled. Production of civilian goods must be increased as much as possible by eliminating waste and inefficiency. But a pay-as-we-go tax program is basic to a successful attack on inflation. And inflation — unless it is checked — could wreck our defense effort.

We cannot pay as we go merely by soaking harder the corporations and those in the upper income brackets.

As the President's Council of Economic Advisers has reported, "by far the largest part of the additional revenue must come from the middle and lower tax brackets. These are the brackets in which the great bulk of the income is located."

Taxes Can Attack Inflation

By spreading tax increases broadly, taking small amounts from many people, inflationary pressure would be effectively reduced. It is the expenditures of the great mass of people, rather than the small numbers in the upper income tax brackets, that create most of the pressure. Moreover, it is possible to increase taxes broadly without killing the economic incentives to produce. Maintaining these incentives is essential to the success of the defense effort.

Our elected representatives cannot be expected to be enthusiastic about a pay-as-we-go tax program. It involves increasing the taxes of the great body of their constituents, an operation completely lacking in political glamour. However, such a program also involves the integrity of the American dollar. And that is absolutely essential to the success of the defense program. We shall be very foolish if we do not let our leaders know that we want them to do everything possible to pay as we go.

McGraw-Hill Publishing Company, Inc.

How to Look at Aircraft Earnings

Air firms' profit rise in 1950 is more than double all-industry average, but margin on sales is low.

The relative profitability of the aviation group is once again presented in proper perspective against the earnings experience of general industrial enterprises. The National City Bank of New York in its current monthly letter presents its annual comprehensive compilation of net income covering the leading corporations engaged in every industrial and commercial activity.

For 1950, a total of 3304 companies are reviewed, with comparisons for 1949.

This survey shows that a total of 27 aircraft and parts companies reported net income after taxes of $82,941,000 in 1950, up some 75 percent over the $47,370,000 shown for 1949. By contrast, all 1693 manufacturing companies covered developed a net income of $9.29 billion, a gain of 32 percent over 1949. The aircraft group showed one of the largest increases among the industrials and well above the average.

This profitability last year reached a new postwar high. But for a proper view of aircraft results, it is essential to analyze performance over a period of years. As indicated here (AVIATION WEEK Apr. 16) the aircraft industry is essentially a contracting business and as such does not lend itself to an exact accounting by precise yearly periods.

►**Erratic Behavior**—Earnings of the aircraft group have been very erratic over a period of years. In 1947, for example, the National City Bank study showed 25 aircraft and parts companies reporting a combined net deficit of $35,280,000. During 1948, while general industry was continuing its high rate of profitability, aircraft turned in a mediocre performance: the 25 companies showing a combined profit of $17,571,000. In 1949 the trend continued strongly upward with a compilation of 27 aircraft units revealing a net profit of $50.9 million.

Of major significance in any industrial manufacturing operation is the profit margin realized on sales. For 1950 the National City Bank grouping of aircraft and parts companies reveals a net profit margin of 4.5 percent. This compared with an average of 7.7 per cent reported by all manufacturing groups. It was not uncommon for major industrial categories to show average profit margins of around 10 per cent and higher.

The average aircraft profit margins for 1950 were also the highest in recent years. For example, the performance in this regard for past years was as follows: 1947, negative 4 percent; 1948, 1.4 percent, and 1949, 3.3 percent.

►**Aircraft Net Below Average**—In respect to the percentage return on invested net assets, the aircraft industry has improved its position but continues to fall far short of the over-all manufacturing average. For 1950 the aircraft group revealed a net return of 14.1 per cent on net assets compared to 8.2 percent in 1949, 2.9 percent in 1948, and a negative 6.0 percent in 1947. By contrast the general manufacturing experience return on net assets was 17.1 percent for 1950, 13.9 percent in 1949, 18.2 percent in 1948, and 17.9 per cent in 1947.

The National City Bank data also reveals that the total book assets of all manufacturing facilities increased to $54.4 billion in 1950 from $50.7 billion in 1949.

By contrast, the aircraft groups book net assets for 27 companies during this same period was up only slightly, from $580.6 million to $586.3 million. At the 1947 year-end, 25 aircraft units showed an aggregate book net asset value of $587.4 million. This would tend to indicate that there has been very little replacement, if any, of physical facilities used in aircraft production. However, a statistical fluke may be present here in that there is no way of knowing the extent of government-owned facilities leased to the aircraft industry. Further, plant properties of unknown magnitude owned by the separate aircraft companies have been completely written off the books through depreciation charges but remain in active utilization.

►**Averages May Mislead**—In viewing the separate measures of aircraft profitability, major qualifications are constantly present. These items arise from price redeterminations, contract renegotiations and attendant tax adjustments. Moreover, averages frequently tend to distort industrial results. For example, while one company may show an unusually high rate of earnings, another may report a substantial deficit, but the average for the group will display moderate profits.

The National City Bank study also discloses a number of interesting ratios on airline profitability. This summary shows 16 air transport companies reporting net income of $34,476,000 for 1950 as contrasted to $19,006,000 in 1949, or up some 81 percent. The erratic swings in airline profitability is further highlighted by the consolidated deficit of $403,000 reported by the group in 1948 and the staggering loss of $11,693,000 shown in 1947.

For 1950, the air transport group showed a profit margin of 4.9 percent, a gain over the 3.3 percent recorded in 1949 and a decided improvement over the negative 3.0 percent in 1947 and 0.3 percent in 1948.

Despite the marked improvement in the airlines profit margins for 1950, this ratio remains far short of that attained by other transportation groups. For example, railroads were able to show a profit margin of 8.3 percent on gross revenues in 1950. Shipping companies also did better, recording 7.7 percent.

Once again, the air transport group led all other transportation categories in respect to a percentage return on net assets. This was a healthy 12.1 percent in 1950 as compared with 7.4 percent in 1949. But in 1948 and 1947 the air transport group failed to show any return on the investment.

►**Railroad Comparison**—In 1950, the railroads were able to earn an average of 5.6 percent on their invested assets and have consistently shown moderate returns on their investment throughout the years. The railroads, however, differ very radically from the airlines in that they have a large fixed investment base represented by such facilities as roadbeds, stations, and rolling stock. The air carriers, on the other hand, have a relatively limited invested base, with its main assets represented by its aircraft. This condition makes for a greater impact in the return on invested capital as airline earnings mount.

Important qualifications are also present in the air transport profitability ratios. Retroactive mail pay awards, for example, have an important effect upon airline earnings from year to year. It is likely, however, that this factor was less of an influence during 1950 than in previous years.

Nevertheless, such compilations as prepared by the National City Bank are very helpful in that they do reveal the major trends of the aviation groups on their own and in relation to the progress shown by other comparable industries.

—Seleg Altschul

1950 Good to Locals, '51 Looks Better

Last year was feeders' best; break-even point drops for most lines.

Local service airlines had their best year in 1950 and are doing still better so far this year First-quarter 1951 traffic ran 20-30 percent over last year, it was about even with the final quarter of 1950, although a first quarter generally slumps seasonally about 20 percent from the preceding quarter,

The 1950 total operating revenue of the locals comes to $27,908,802 After expenses of $27,681,329, that yields a net operating income of $227,473 before income taxes and other adjustments

▶ **Only the Beginning**—Main reason their combined operating profit margin is so low is that many locals are just starting Four of them were not operating at the beginning of 1949 (All American, Bonanza, Ozark and Southern) If you look only at the DC 3 locals that have operated two years or more, the record shows up much better revenues $17,827,369, expenses $16,989,961, operating profit $837,408

Most of the locals are moving fast in the direction of relative self sufficiency, though it may take years to reach that Break-even need of the DC-3-operating locals declined 14 percent in 1950 to 48 cents a plane mile On a ton-mile basis, break-even need declined 25 percent to 65 cents Three of them--Pioneer, Southwest and Lake Central--had break-even need of less than 30 cents a plane mile with regard to mail pay

Average mail pay received in 1949 per DC-3 plane mile was 54 cents, in 1950 it was down to 50 cents While mail revenues per mile declined 8 percent for DC-3 operators in 1950, nonmail revenue per plane mile increased—from 34 cents in 1949 to 39 cents in 1950

The local DC-3 operators in 1950 earned 1½ cents a plane mile net operating income despite declining mail revenue, that compares with a 1½-cent loss per mile the year before

The average costs of all DC 3-operating locals declined 3 cents a plane mile—from 90½ cents in 1949 to 87½ cents in 1950 This is despite two special factors working against the industry showing in 1950

- **Some 6 million miles** of local service in 1950 were flown by newly started operators (costs are exceptionally high at first)
- **Prices and wages rose** continually in 1950

Local Service Airlines

1950 Revenues and Expenses

(Cents per Revenue Ton Mile)

DC-3 OPERATORS	REVENUE NON-MAIL	REVENUE U. S. MAIL	REVENUE TOTAL	TOTAL OPERATING EXPENSE	NET OPERATING PROFIT*	BREAK-EVEN NEED**
All American	60.57	70.24	130.81	144.73	(13.92)	84.16
Bonanza	56.06	102.31	158.37	180.36	(11.20)	114.80
Empire	46.79	70.61	117.60	114.84	2.82	68.06
Frontier¹	48.24	105.73	153.97	162.37	(8.40)	114.13
MCA-Route 106²	08.53	40.47	90.00	98.32	(3.93)	43.79
Ozark³	53.24	169.18	222.42	434.66	(207.23)	371.82
Piedmont	58.49	53.21	111.79	101.84	9.80	43.35
Pioneer	60.14	21.21	81.35	73.78	8.87	08.64
Robinson	70.09	63.95	133.34	164.60	(1.78)	64.71
Southern	53.87	188.27	242.69	226.78	16.00	173.28
Southwest	50.09	37.23	87.32	77.02	10.30	26.93
Trans-Texas	43.60	108.49	152.39	143.71	5.68	90.81
West Coast	65.18	78.04	141.22	130.21	10.01	65.13
DC-3 Average	90.00	87.61	121.25	118.90	2.21	84.00
OTHERS						
Central	58.44	407.77	461.21	499.98	(38.45)	443.22
Lake Central³	47.91	44.88	92.79	89.80	2.89	42.05
Mid-West	81.92	607.01	658.90	622.19	36.66	670.21
Wiggins	88.60	887.64	968.28	958.17	(33.94)	871.26
Wis. Central	54.78	164.50	218.28	199.37	19.91	144.59

* Figures in parentheses are losses.
** Operating expense less non-mail revenue roughly shows "break-even need" for mail pay
¹ Includes Monarch and Challenger
² Includes Turner
³ Started service Sept 26, 1950.
Source. Ray and Ray.

Comparison: 1950 vs. 1949* Revenues and Expenses

(Cents per Plane Mile)

OPERATOR	YEAR	TOTAL OPERATING REVENUES	OPERATING EXPENSES DIRECT	OPERATING EXPENSES GROUND & INDIRECT	OPERATING EXPENSES TOTAL	NET OPERATING PROFIT	BREAK-EVEN NEED
Empire	1950	84.55	44.14	38.47	82.61	2.04	60.08
	1949	81.87	48.34	33.33	83.57	2.10	52.70
Frontier¹	1950	36.00	43.72	45.81	86.53	(4.03)	58.00
(Challenger)	1949	68.22	68.00	44.34	90.53	(0.87)	60.48
(Monarch)	1949	90.02	47.07	41.86	88.93	(1.00)	60.72
Piedmont	1950	86.88	43.08	33.87	77.08	7.46	60.80
	1949	79.72	47.20	31.00	78.80	0.90	60.72
Pioneer	1950	86.27	38.87	41.48	80.38	8.92	27.19
	1949	88.87	40.40	38.28	78.68	2.19	36.43
Robinson	1950	99.48	52.71	48.04	100.71	(1.31)	48.98
	1949	98.16	60.00	60.12	124.13	(24.96)	72.98
Southwest	1950	93.20	34.00	47.38	86.31	10.69	26.78
	1949	90.20	47.08	46.70	93.08	2.57	46.14
Trans-Texas	1950	81.77	06.50	90.62	77.12	4.08	53.68
	1949	78.68	42.28	64.00	77.27	1.36	37.08
West Coast	1950	100.74	46.28	32.48	98.73	8.01	47.00
	1949	100.80	00.00	08.02	104.00	(0.85)	09.60
Wis. Central	1950	98.08	40.00	40.08	90.98	8.00	08.08
	1949	90.31	80.52	36.46	81.68	2.80	06.00

* Figures in parentheses are losses.
¹ Includes Monarch and Challenger
Source. Ray and Ray

▶ **Big Plane Trend**—Virtually all the local service airlines now use DC 3s exclusively or are converting to them now Operations of the smaller, single-engined planes apparently cannot pay off in the foreseeable future

Here is why most observers say single-engined scheduled service will not pay

Mid-West's total operating expense in 1950 was 38 cents a plane mile on its 3-passenger Cessnas That is a cost of 13 cents a seat mile But first-class air travel fares are 6 cents a seat mile So even if Mid-West had filled every seat on every flight, costs per seat mile would have been more than double the revenue.

The single-engined Cessna carries one pilot and 3 passengers A DC-3 can carry 24 passengers, requires two pilots Pilot pay at one pilot per 12 passengers capacity is bearable; at one pilot per three passengers, pilot pay alone eats up a huge chunk of the revenue Same relationship holds true generally with fixed overhead and station personnel

Even the new 11 passenger de Havilland Doves that Wiggins Airways is ordering are eyed skeptically by some local airline observers Although the Dove is an exceptionally low-cost plane, pay for two pilots to haul 11 passengers is high

The trend in local service, as well as in trunklines, is toward bigger planes to spread overhead and unit operating cost over a bigger payload But CAB is anxious to have Wiggins show what a modern airplane can do in local service

Observers believe small-plane locals such as Central, Mid-West and Wisconsin Central will have to switch to DC-3-type operations or go under for want of CAB mail pay support Compared with the average 1951 DC 3 local operation at 65 cents a ton mile, ton-mile cost, last year for these three was Central $4 43, Mid-West $5.70, and Wisconsin Central $1.45

Towns like Enid, Okla, are crying for CAB to give them big plane service Main objection to small plane service is its lack of schedule reliability The single-engined plane is not allowed to give scheduled service when weather is bad enough to require instruments They may not fly at night Result While DC 3 operators completed 97 percent of scheduled flights last year, Mid West completed 86 percent and Wiggins only 72 percent

▶ **Locals vs Trunks**—Local service airlines have one big drawback constantly working against them That is the inherently high cost of short-haul operations frequent climbing, landing and taxiing, high ground handling and ticketing cost per revenue passenger mile, the fact it's almost impossible to book a high load factor on a run that is taking on and debarking passengers all the way

Operating expense per ton mile of DC-3 locals last year was $1 19, compared with trunkline average expense of 47 cents a ton mile carried

Nevertheless, the locals are approaching their break-even points more rapidly than was expected when CAB launched the "feeder experiment" after World War II CAB is all-out for continued development of local service airlines A new, low-cost plane is what is needed, Delos Rentzel says

CAB, CAA Scored By Nonsked Lines

Nonskeds opened their "fight for survival" before a sympathetic Senate Small Business Committee, charging they are being "harrassed, heckled, and regulated" out of business by Civil Aeronautics Board and Civil Aeronautics Administration

They based their case against CAB economic regulation on the contention that they are not competitive with the scheduled airlines' "luxury" service

California Eastern Airways' Andre De Saint Phalle gave figures to show that scheduled airlines have not tapped the mass market, the new air transportation frontier being developed by nonskeds 94 percent of the total inter city common-carrier passenger traffic in 1938 went by bus or rail coach, in 1950 it was 93 percent

At the outset, the committee's chairman, Sen John Sparkman announced that the hearings "are not an over all investigation of CAB and its operations," but that any testimony bearing on the order limiting nonskeds to three trips a month between major points would be received Nonskeds plan to submit evidence alleging Board domination by scheduled lines

Sparkman said the committee will aim to determine

- **Under what authority** the nonskeds began operation,
- **Whether they contribute** to or damage the economic strength of air transportation,
- **If they are a valuable asset** to the industry, whether CAB under the 1938 CAA act can permit them to operate, filling a definite role,
- **If not, what changes** in the law should be made

Points developed at the hearings

- **Amos Heacock**, president of Air Coach Transport Assn, charged that on air transport matters, the Department of Defense, as well as CAB, is controlled by the scheduled lines He named C R Smith, American Airlines' president who has just completed a tour of duty as a major general and assistant to Secretary for Air Thomas K Finletter, as "the scheduled airline power in the Pentagon"
- **If assured they can go on operating**, nonskeds will be able to continue to offer their low-cost service with new full-cost planes, Miami Airlines' Capt R W Duff said Sparkman had suggested that the low expenditure for war surplus planes might have been the factor responsible for making the low-cost service economically possible
- **H B Robinson** of Peninsular Airlines reported that Pan American World Airways' planes had been placed on the ramps at Miami Airport to block their use by his company He cited this as one example of the tactics the nonskeds have been up against

Capital Buys Five KLM 749 Connies

Capital Airlines has bought five more Constellation L-749s which KLM Royal Dutch Airlines will trade in to Lockheed Aircraft for 1049Cs next year Capital is buying the 749s at $550,000 each, completely overhauled by Lockheed

Capital will re do the interiors at a cost of $50,000 $175,000 each and put them in service about March-April 1953 This will raise Capital's Constellation fleet to 12 by spring of 1953 Capital already is operating five former KLM Connies, and it has bought two more from KLM on a similar deal with Lockheed, at $700,000 each, to start operations January next year

Capital's present fleet is 5 Lockheed Connies, 21 Douglas DC-4s, 4 Douglas all-cargo C-54s, 24 Douglas DC 3s, 1 Douglas cargo C-47, 3 Douglas Super DC-3s

CAB-Sponsored Interchanges to Start

One-plane service, Denver-Miami by Braniff Eastern interchange, and Kansas City Miami, by Eastern-Mid-Continent interchange, will start in the near future

The Civil Aeronautics Board has approved the agreements between these airlines The Board itself proposed them last year Carriers need only submit their schedules 15 days before starting the one-plane service Interchange points are Memphis on the Denver Miami run St Louis on the Kansas City- Miami run (see map, AVIATION WEEK Apr 16). Passengers formerly had to change planes at these points

BEA Still In Transition

British European Airways is still undergoing major build ups in services and equipment and is likely to continue doing so for some time to come Following extensive retrenchment to cut losses—January of this year turned out to be the worst month ($648,000 deficit) the airline has experienced since November 1948, despite a 16 7 percent increase in revenue—the British company is working on new plans to reverse the situation

Acquisition of new planes figure high in the schemes The carrier has already taken delivery on three Douglas Pionairs (28-seat DC 3s) and will soon have two Armstrong Siddeley Mamba powered Dakotas (C-47s) for freighter operations Four Vickers Vikings which BEA purchased from South Africa, are now undergoing overhaul

BEA has run into some bugs with its new Airspeed Ambassador Elizabeth-class transports, which will delay deliveries until the end of next month The seven Handley Page Marathon Clansman-class airliners which have been ordered are undergoing modifications which will also delay putting them into service before next spring These planes are scheduled to be used in Scotland, handling services north of Edinburgh and Glasgow The new Vickers Viscount Rolls Royce Dart turboprop planes BEA has on order have been named the Discovery class

High on the list of the carrier's new services will be opening of its experimental helicopter route which will begin June 1, linking Birmingham with Northolt and Heathrow, with three services in each direction daily (excepting Sundays) using three Sikorsky S 51 King Arthur-class craft This service will be cut down to two trips daily in September and then once a day in the winter The lessons learned on these services will be used when new copters—the Bristol 171 and 173—are introduced

An analysis of BEA's ten routes shows that the highest rate of profit is shown on the four routes including Berlin, in the following order Hamburg-Berlin London-Dusseldorf-Berlin, London-Amsterdam-Hamburg-Berlin, and Dusseldorf Berlin

AA Reports Record First-Quarter Net

First-quarter earnings of American Airlines are a record $2 914,000 after $4,350,000 federal income taxes This compares with $1,331,285 net earnings for first quarter last year after a tax credit of $520,000

Gross revenues of $33,900 000 yielded $7,200,000 operating profit Expenses were $26,700,000 (up 19 percent over 1950)

Says American "Costs continue to rise and increased expenses for the balance of the year are anticipated."

First-quarter traffic figures passenger miles 515,600,000; mail ton miles 3,400,000, cargo 11 900 000 ton miles March passenger miles hit an all-time high of 190,000,000

American received four new Douglas DC 6Bs this month expects 17 more this year (including three cargo-carrying DC 6As)

COMET GALAXY

Three sleek DH Comet transports in BOAC markings make an imposing photograph as they fly in formation near Hatfield The nearest plane is the first being delivered to the British carrier, the other two are owned by the Ministry of Supply Boundary layer fences had not yet been installed on the first BOAC plane at the time of this picture.

Airline Salaries

Salaries, bonuses and stock holdings in 1950 have been reported for officials and directors of three U S trunklines, and one freight carrier

• **Eastern Air Lines Inc** President and director E. V Rickenbacker salary $50 000, director's fee and retirement plan $8087, $104 000 shares of common stock (1949 $35,000, $5561* and 100,000 common shares) first vice president and director Paul H. Brattain $22 583 $4547* and 19 000 common ($27 500 $4060* and 19 500 shares) second vice president and director, S L. Shannon $27 083 $3364* and 8000 common ($25 000 $2788* and 8000 shares), secretary-treasurer and director T F Armstrong $19 583 $2501* and 2508 common ($17 500 $2247* and 3008 shares) assistant secretary assistant treasurer and director J W Moore $14 500 $1832* and 500 common ($12,000, $1531* and 500 shares) vice president L P Arnold $21 656 $2050* and 2600 common ($17 500 $2025* and 2600 shares) vice president M M Frost $24 583, $2487* and 200 common ($22 500 $2182* and 300 shares) vice president S. de J Osborne (resigned 3 15-50) $4687 no retirement plan no stock ($22 500, $1783* and 240 common), and the following directors Everett R. Cook, directors fees $400 and 1300 common ($400 and 1300 shares) James M Cox Jr $500 and no stock ($400) Paul M Davis $200 and 2800 common ($200 and 2800 shares) George M Howell $800 and 1000 common ($400 and 2000) Hugh Knowlton $400 and no stock ($500 and 100 common) Wiley L. Moore, $700 and 400 common ($600 and 400 shares) Stuyvesant Peabody Jr $300 and 300 common ($500 and 1000 shares) Paul E Reinhold, $600 and 1500 common ($400 and 3000 shares) Laurance S Rockefeller $500 and 70 200 common ($800 and 80,000 shares)
(* Directors' fees and retirement plan)

• **Trans World Airlines.** President and director, R S Damon, salary $84 166 bonus $17 799 directors fee $500 and 1000 common shares (1949 $62 500 bonus $95 00, and 1200 common shares) chairman of the board and director Warren Lee Pierson $64 791 bonus $10 710 $400# and 2000 common ($58 749 bonus $55 00 and 1100 shares), vice president-sales and director, E O Cocke $27 281 bonus $8174 $500# and 400 common ($23,500 bonus $91 00 and 100 shares) vice president, operations and director J A Collings, $44-583 bonus $12 770 $400# and and 401 common ($35 000, bonus $51 00 and 1 share), vice president treasurer and director A V Leslie $24 706 bonus $4090, $400# and 300 common ($25 400, and $91.00 bonus), vice president, C E Fleming $19 952 bonus of $6000 and 261 common ($17 075, bonus $91.00 and 61 shares) secretary George H. Clay $17,935 bonus $4205 and 300 common ($12 919 bonus $91 00) treasurer, Eric M. Constable, $13 874 and bonus $1824, comptroller Matthew Piedinec, $14,870 and bonus $2077 and the following directors Palmer Bradley salary $800 and bonus $11 00 ($900 and bonus $11 00) Powel Crosley, $500 bonus $11 00 and 1120 common shares ($500 and bonus $11 00), Noah Dietrich $900 and bonus $11 00 ($400, bonus $11 00 and 1000 common shares), A. B Eisenbouen $700, bonus $11 00 and 120 common ($1000, bonus $11 00 and 120 shares), Oscar Holcombe $500, and bonus of $11 00 ($800 and bonus $11 00), Sidney Maestre, $500, bonus of $11 00 and 120 common ($900 bonus of $11 00 and 120 shares), A D Simpson, $800, bonus of $11 00 and 120 common ($900 bonus $11 00 and 120 shares) N S Talbott, $700 bonus $11 00 and 120 common ($800, bonus $11 00 and 120 shares), Loyd Wright, $400 bonus $11 00 and 240 common ($300 bonus $11 00 and 240 shares) F W. Ayres, $200, bonus $6 52 Harry Rogers $500 and bonus $6 42, and Thomas A Slack $200 and bonus $6 42
(#Director's fee)

• **United Air Lines** President and director, W A. Patterson, salary $72,028, retirement and group life insurance plan $6597 and 5300 common shares, (1949 $62 500 $6915* 10 preferred shares 1150 common and 5000 management shares) executive vice president and director Otis E Kline $6750 $385* and 7500 common, vice president, operations and director J A Herlihy $42 001 $3223* and 2968 common ($37 500 $2526*, 968 common shares and 2000 management shares) vice president, passenger service D F Magarrell $23 773 $1608* and 1080 common ($20 000 1216*, 80 common shares and 1000 management shares), vice president sales Harold Crary, $26 952, $2126* 54 preferred shares and 2172 common ($21 000 $2975*, 54 preferred, 1172 common shares, and 1000 management shares) vice president, economic controls, Hal E. Nourse $19 531 $1620* and 1080 common shares ($19 000, $1432*, 80 common and 1000 management) vice president personnel, R F Ahrens, $19 523 $1492* and 1402 common ($19 000 $1314*, 2 common and 1000 management) vice president traffic administration R. W Ireland $22-500, $2759*, 2045 common ($25 000 $2631*, 45 common and 2000 management), vice president, finance and property, Curtis Barkes $17 140 $1127* and 751 common ($15 600 $922* 1 common and 750 management) secretary and assistant to president, S. P Martin, $12 330 $826*, and 750 common ($12 000, $774* 200 common and 750 management), comptroller Carroll Blanchar, $12 050 $627* and 501 common $11-700 $525*, 1 common and 500 management) treasurer and assistant secretary A M deVonrsnry $3333 and $154* treasurer N B. Haley $11 525 $1626* ($13 000, $2071* and 500 management) and the following directors Martin C Ansorge salary $800 750 common and 100 preferred shares ($900 100 preferred and 750 common shares) Gardner Cowles, $500 salary, 1100 common and 450 preferred shares ($500 and 1100 common shares) Justin W Dart, $800 and 15 406 common ($500, 700 preferred and 15,406 common) Paul M Gedehn 600 common (600 common) Paul G Hoffman 7 preferred and 130 common (7 preferred and 130 common) Eric A Johnston $500 and 1000 common ($500 and 1000 common) John J Mitchell $600 and 4204 common ($800 and 2202 common)
(* Company contribution to retirement plan and officers group life insurance plan)

• **Slick Airways, Inc** Chairman of the board and director Earl F Slick no salary, $249 000 debenture*, and 56 660 common shares (1949 no salary $55 000 debenture* and 10 152 common shares) president, Thomas L Grace, salary $12 320 $4000 debenture*, and 5286 common shares ($8150 and $4000 debenture*) executive vice president, William E Hellan $2704 $2000 debenture*, and 4151 common shares, vice president secretary and director Joseph F Grant, $10 040 $2000 debenture* and 3128 common shares ($8820, $2000 debenture*, and 1 common share), vice president, treasurer and director, David R. Stewart, $10 040 $2000 debenture* and 3120 common shares ($8497 and $2000 debenture*), assistant chairman of the board and director Louis J Moorman, 1 common share (1 common share), assistant secretary John W Wulbert, $5351 and 500 common shares and the following directors Tom B. Slick, 50 000 common shares (50 000 common) Charles F Urschel 2500 common (2500 shares), Charles F Urschel, Jr 10 001 common (10 001 shares), W B Dangmore, 1 common (1 share) Samuel R. Milbank 1500 common and $14 000 debenture* (1500 shares and $14 000 debenture*)
(* 4% convertible income debenture.)

Local Service Airlines' Salaries

More 1950 salaries and stock holdings of executives and directors have been announced by the following local service airlines (1949 figures in parentheses):

• **Caribbean-Atlantic Airlines, Inc of Puerto Rico** President Dionisio Trigo salary $10,-000 and 22,731 common shares (1949 salary $10,000 and 22,731 shares) vice president, Benigno Trigo $3500 and 22 731 common shares ($2500 and 22 731), vice president, traffic Frank H Sheldon, $8400 and 10 common shares ($2100 and no stock), vice president, operations José M Sierra $10 142 and 80 common shares ($10 000 and 1 share) treasurer, L. A. Lockhart $7500 and 250 common shares ($7200 and 251 shares) secretary, Adolfo Valdes, no salary this year (1949 $1500 and no stock), and the following directors and their holdings of common stock Frank Ballester 435, Henry G Molina, $500, Juan Cabrer 700 Miguel Fernandez, 1507, and Juan Trigo 17 208

• **Pioneer Air Lines, Inc.** President and director, Robert J. Smith, salary, $16 125 and 20,818 common shares (1949 salary $12 000 and 20 818 shares) vice president and director Harold B Seifert $10 800 and 264 common shares ($10 200 and 264 shares) vice president and director, H L. Lawrence $9000 and 15 common shares ($7500 and 15 shares), secretary-treasurer and director Eugene W Bailey $5600 and 956 common shares ($8400 and 956 shares) chairman of the board, W F Long $5000 and 27 291 common shares (27 291 shares) and the following directors Gene Howe, 100 common shares (100 shares) Charles B White 400 common shares (200 shares), Raymond Pearson 1500 common shares (1500 shares) J Wesley Hickman 645 common shares (623 shares)

• **Southern Airways Inc** President and director, Frank W Hulse salary $8025 and

33,054 common shares (1949 salary $6783 and 69,289 shares), vice president, Tom D Eve, $9072 and 1917 common shares ($4653 and 1917 shares); vice president and director, Ike F Jones, no salary, 3167 common shares (3167 shares), secretary and treasurer, George F Ealey, $5723 and 200 common shares ($4081 and 800 shares); assistant treasurer, F L McLeod, $4805, assistant secretary, W. B. White, Jr, 32 common shares, assistant secretary and director, Cecil A Beasley, $65 00 ($25 00) and the following directors: Henry P Johnston, 2500 common shares (2500 shares), Birney Imes Jr, 1000 common shares (1000 shares), A M Spies, Jr, 200 common shares; Robert Z Cates, 6000 common shares; Ernest H Woods, 2000 common shares, and E B Stephens, 960 common shares.

• **Southwest Airways Co.** Chairman of the board and director, Leland Hayward 143-985 common shares (1949 145,988) president and director, J H Connelly, salary $10,333 and 148,252 common shares ($10,000 and 148,252 shares), vice president, T R. Mitchell $11,233 and 200 common shares ($11,200 and 200 shares); treasurer and director, A. W Johnson, $10 400 and 2000 common shares ($10 200 and 1300 shares); secretary and director, Walter Roche, no salary, 718 common shares (718 shares); assistant secretary and counsel, C. H. Sullivan, $8400 and 1600 common shares ($8400 and 100 shares); assistant secretary and director, F L Hendrickson, no salary, 4290 common shares (4290 shares), and the following directors, Bert Allenberg, 10,400 common shares (10,400 shares); Daniel T O'Shea, 2878 common shares (2678 shares), Harry White salary $8687 and 20,254 common shares (no salary and 20 254 shares)

• **Trans Texas Airways.** President and director, R E McKaughan, salary, $22,400, bonus of $80 00 and 28,800 common shares (1949 salary $22,493 bonus $110 00 and 20,000 common shares); vice president and director, H E Erdman, $18 000 bonus $80 00 and 4018 common shares ($18 000, bonus $110 00 and 4018 shares); secretary-treasurer, M. L. Muec $5000 bonus $60 00 and 25 common shares ($5100 bonus $110 00 and 25 shares); and the following directors: J K Aver bonus $50 00 and 134 common shares ($70 00 bonus and 134 shares); J M Brooke bonus $40 00 and 100 common shares (bonus $100 00 and 100 shares), W C Leatherwood bonus $80 00 (bonus $110 00)

• **Turner Airlines Inc (now Lake Central).** President and director Roscoe Turner, salary, $9000 (1949 $9000); executive vice president and director John V Wessner, $10 000 (no 1949 report); treasurer R E. Ross, $10 000 ($7200); vice president, operations Robert W Clifford, $3000 and 930 common shares ($8000), vice president, traffic, Mel Anderson, $8000 (no 1949 report); secretary and general counsel, K. Robert Hahn, $7000 and 80 common shares (no 1949 report)

• **West Coast Airlines, Inc.** President and director Nick Bez, salary $8000 and 18,497 common shares (1949 salary $8000 and 18,497 shares), vice president and director, H A Munter, $12 500 and 3030 common shares ($18 000 and 3030 shares), vice president and director, William Calvert, 6000 common shares (5200 shares); secretary treasurer, R. A Duwe, $7800 and 625 common shares ($8700 and 625 shares), and the following directors: C E Gunderson, 2675 common shares (1000 shares) and D K. MacDonald 5000 common shares (5000 shares)

• **E W Wiggins Airways.** President and director, Joseph Garside, salary $6400 and 4417 common shares (1949 $5200 and 4417 shares), executive vice president and director, Harold E Shaw $7800 and 1680 common shares ($7800 and 1680 shares), clerk, Frederic S. Tobey $5149 and 851 common shares ($5149 and 851 shares); assistant treasurer, Sven Stenberg, $4086 and 77 common shares ($4080), assistant treasurer and director, Harold E. Martin $4680 and 350 common shares, and the following directors: John Guest, 700 common shares (700 shares), E W Wiggins, 3080 common shares (3080)

• **Wisconsin Central Airlines, Inc.** President, Francis M. Higgins, salary, $18 000 and 8187 common shares (1949 $11 882, and 8187 shares), executive vice president, Harold N Carr, $10,500 and 525 common shares ($9888 and 125 shares); secretary-treasurer Arthur E Schwendt, $7280 and 1075 common shares ($6810 and 1275 shares), and the following directors: Gar-nel F Desaurels, director's fee $515 00 and 1487 common shares ($465 and 1487 shares); Fred V Gardner director's fee $455 and 6817 common shares ($535 and 6817 shares), Milo F Snyder director's fee $500 ($585), Howard A. Morey, director's fee $555 and 500 common shares ($570 and 500 shares), A L Wheeler, director's fee $385 and 200 common shares ($140), Arthur E. A Mueller, director's fee $050 and 10,750 common shares ($290 and 3200 shares), G F Slezak director's fee $325 ($410); Donald B. Olen, director's fee $250 and 50 common shares ($375 and 1240 shares)

• **U S Airlines, Inc.** President G M McCleery, no salary, 11,185 capital shares (1949 11,000 shares); vice president, R. W Starkey, salary, $10 000 ($10 000), and secretary-treasurer C F Wicks, salary $6000 (no 1949 report)

SHORTLINES

▶ **Air Express**—February air express shipments totaled 455,315 lb—55 percent over a year ago. Revenue of $2,700,000 was up 89 percent and weight of 13,200,000 lb was up 131 percent

▶ **American Airlines**—AAL's new DC-6B, in its first flight East made San Francisco Washington in 7 hr., 6 min, bringing press men to cover MacArthur's arrival. While not a record, it is close. For example, record commercial Los Angeles-Washington flight time is 6 hr 57 min, claimed by a TWA Connie, April 1944

▶ **Appointment Airlines Corp**—Passenger shuttle operator between New York Port Authority airports flew 8432 shuttle passenger miles the first quarter of 1951. Special charter flights to other points totalled 18,770 passenger miles

▶ **British European Airways**—BEA starts helicopter shuttle service from London to Birmingham June 1. Sikorsky S-51 copters will serve both Heathrow and Northolt airports at London. Time from London to Birmingham on copter service is 70 minutes. Service (3 trips a day) connects with BOAC trans-Atlantic flights at London

▶ **Colonial Airlines**—Colonial's 21-year, completely safe record includes 387,933,105 passenger miles; 522,295 landings and takeoffs, 1,447,227 passengers carried

▶ **Continental Airlines**—Continental has CAB authorization to serve Great Bend, Kan. Though small, Great Bend is as big as ten other towns now served

▶ **Flying Tiger Line**—All-air-cargo operator has started air freight truck pick-up service of its own at Los Angeles, replacing contract-type trucking service

▶ **Italian Airlines**—LAI has started a weekly flight New York-Milan-Rome, leaving Idlewild 9 30 pm Fridays

▶ **Pan American World Airways**—PanAm adds a second weekly flight, New York-Boston-Nice-Rome on June 1. PanAm also serves Rome three times a week, via Paris. PanAm opened Rome service Jan 2

▶ **Pan American-Grace Airways**—Panagra, the first week of this month, operated 2,529,000 passenger miles—25 percent over a year ago

▶ **Seaboard & Western Airlines**—S&W utilization of its DC-4s on the Pacific Airlift averaged 12 hr, 24 min in February. Average since July of last year—12 hr, 11 min. . . . First-quarter revenues for Seaboard were $2,605,000. The 6,790,000 ton miles of air freight were up 47 percent over a year ago. . . . Since Korea, Seaboard's Pacific Lift DC-4s have carried over 4,000,000 lb. freight and 5354 passengers on more than 400 Pacific crossings

▶ **Southwest Airways**—CAB last week was to hold public hearings at San Mateo, Calif on the fatal accident at Santa Inez peak on Apr 6

▶ **Swissair**—Swissair, Geneva, is the third foreign airline to get CAA certification as an aircraft repair station for U S registered planes on international routes. Other two are KLM and BOAC

▶ **United Air Lines**—March UAL traffic records 139,327,000 passenger miles, up 40 percent over a year ago, 1,534,000 mail ton miles, up 48 percent, 1,077,000 express ton miles, up 53 percent, and 2,437,000 freight ton miles, down 6 percent. . . . War may be helping United keep its stewardesses. UAL personnel management guesses average stewardess stay with UAL before getting married used to be 18 months—is now 29 months.

AVIATION CALENDAR

May 1-17—Fourth foreign transportation institute, at the American University, School of Social Sciences and Public Affairs, Washington 6, D C

May 4-6—Annual conference of the California Aviation Education Assn , California Polytechnic, San Luis Obispo

May 4-6—Fourth annual national intercollegiate air meet, Max Westheimer Field, Norman, Okla

May 7-11—National Fire Protection Assn 's annual meeting of committee on aviation and airport fire protection Hotel Statler, Detroit Mich.

May 10-11—Meeting on traffic estimation and forecasting for scheduled airlines research personnel, called by ATA, at Palmer House, Chicago

May 12-13—Airlines Medical Directors Assn., eighth annual meeting Hotel Shirley Savoy Denver Colo

May 16-18—1951 spring meeting of Society for Experimental Stress Analysis at National Bureau of Standards and Wardman Park Hotel Washington D C Send inquiries to Dr Edward Wenk, Jr , David Taylor Model Basin, Washington 7, D C

May 17-19—Annual convention of the Women's Aeronautical Assn of the U S , Little Rock Ark

May 18-20—Dedication of new Oneida County Airport, N Y

May 21-24—Tenth annual conference of the Society of Aeronautical Weight Engineers, Hotel Jefferson St Louis Mo

May 22—Aircraft Technical Committee national meeting Aircraft Industries Assn , Statler Hotel Washington D C

May 26—Second annual maintenance and operation clinic, Reading Municipal Airport Pa Weather date May 27

May 27-30—Third annual Wright memorial glider meet South Dayton Airport, Dayton Ohio

June 13—Semi annual meeting of the aviation division of the American Society of Mechanical Engineers, Royal York Hotel, Toronto Canada

June 13-16—Aviation Writers Assn , convention Hotel Commodore N Y

June 15-July 1—International aviation display Grand Palais and Le Bourget Airport, Paris

June 18-July 6—Three week Air Age Institute course, Parks College of Aeronautical Technology of St Louis University, East St Louis Ill

June 23—1951 British National Air Races, Hatfield Aerodrome, Hertfordshire, for light, heavy craft, and jets Entry blanks available from National Aeronautic Assn , 1025 Connecticut Ave N W , Washington 6 Closing date for receipt of entries is May 1

June 27-28—1951 annual summer meeting, Institute of Aeronautical Sciences, IAS Western Headquarters Bldg , 7660 Beverly Blvd , Los Angeles

PICTURE CREDITS

2—(Lockheed Neptune) Lockheed (Regent Rocket) Regent Aircraft Corp ; 13—Boeing Airplane Co ; 18—Chase Aircraft ; 21 (top) U S Air Force 25—Boeing Airplane Co 54—deHavilland

COCKPIT VIEWPOINT

How About Simpler Approaches?

Some interesting sidelights on "modern flying" were shed recently by comparing the instrument approaches of two airplanes. Both were scheduled airline operations. One approach concerns an airport with up-to-date facilities; the other field has "obsolete" equipment.

On successive days gusty surface winds, rain squalls and 1000-ft ceilings prevailed from Washington, D. C., to Boston. Shortly before midnight the first day a Convair made an approach at Washington National Airport. Visibility was restricted due to rain so an ILS approach was made with GCA monitoring. During the entire final letdown GCA insisted that the ship was 150 to 300 ft. HIGH on the glide slope and therefore instructed the plane to descend. Both ILS instruments however, showed the plane to be several feet LOW. The captain attempted to comply to some extent with GCA until he reached minimum altitude when the ship passed through a heavy rainshower.

As the rain abated the pilots saw two rows of lights and, thinking they were runway lights, prepared to land. A glimpse was then caught of some green lights, which would indicate the end of the runway, so the captain pulled up. It was realized shortly that the lights that had been seen were the "slope line" approach lights, not runway lights and that the green lights were on the threshold, not at the far end of the field. Another ILS approach was made without GCA monitoring, keeping in mind the approach lights. This was successfully completed.

The following morning the plane was test flown to check the ILS equipment. It was found to be normal. A second run made with GCA showed that GCA was still placing the ship well below the glide slope.

Providence Airport had roughly the same conditions at the time of another Convair approach the next evening. Instrument facilities at Providence consist of one low powered loop type range with a "Z" marker. That is all. This approach, although a bit choppy for the passengers, was entirely uneventful. At no time was there any doubt in the cockpit as to the whereabouts of anything. It was simply a case of listening to the range signals during an "old fashioned" approach.

►**GRIM LESSON**—There is, unfortunately, a grim lesson in these two cases. On the one hand, Washington, we have an airport complete with all the modern devices. The pilot contacts the tower on four different frequencies from the time he enters the area until he is at the ramp. He may use eight or more navigational facilities, four on the final approach alone. Through the earphones comes an unceasing chatter of traffic information, clearances to other ships, weather reports, GCA monitoring, the identification of various navigation facilities and the beeping of three marker beacons. The pilot's eyes must scan the usual flight instruments, the ILS cross-pointers, the ADFs, the colored lights of markers, check for ground contact, locate the approach lights, the threshold lights and the runway.

In the Providence case we find considerably less. There is but one range frequency and one ground communication frequency. One ADF points either ahead or behind and one white light glows when over the station. A minimum of information comes from the ground station, there are no confusing approach lights to think about, no GCA monitoring, no weaving ILS needles, no returning of frequencies.

Admittedly an undersupply of facilities is undesirable, the same is true of an oversupply. In both of these cases the pilots were familiar with the airport in question. Both captains were fully qualified 10 year men with 7-year co-pilots beside them. At Washington however, an unnecessary work load was imposed. At Providence the pilots were able to devote their entire energy to the task at hand without the bewildering array of facilities and the interminable chatter from below.

The only tangible gain at Washington is a minimum altitude a scant 200-ft lower. The loop-type station at Providence is now several decades old, a "range" approach is no longer stylish and, if current planning continues, will not be possible a few years hence. The vogue today is ILS and GCA and omnirange. But what has been accomplished? Has aviation worked hard for ten years merely to lower minimums by 200 ft. with reduced safety?

Some place along the line we have gone amiss. Neither the "Providence" method nor the "Washington" method is satisfactory. But neither can be ignored. The CAA's program of decommissioning the low frequency ranges in favor of the vastly superior "omnis" is sound. The use of specialized VHF communications frequencies has merit and several other plans must also be placed in effect.

►**LET'S USE THEM RIGHT**—Therefore the answer lies not so much with the available facilities as with their use. In a cockpit, as in a library, there can never be too many sources of reference material available for the pilot. However, no single approach should require that ALL facilities be used.

The ideal approach is one made without the necessity of earphones, with only one or two navigation instruments plus the regular flight gauges, without retuning a single radio or resetting any knob.

Until there is a return to simplicity in flight approaches, aviation will make slow progress in the field of bad weather landings.

It may be of interest to add that this author was present on the flight test of the Washington ILS and GCA, personally made the Providence approach and can verify every detail related here.

—R. C. Robson

WHAT'S NEW

New Books

The Airmail—Jennies to Jets is probably the most readable book yet published on the development of mail flight in the United States, mostly because it is told first-hand by the man intimately connected with the operation from the start—Capt. Benjamin B. Lipsner, first to hold the title, Superintendent of the U. S. Aerial Mail Service.

As told to Leonard Finley Hilts, Capt. Lipsner frankly details the manifold problems encountered in organizing the first mail flights, made with the ubiquitous Curtiss Jennies. He lightens the tale with wonderful glimpses of the personalities involved, both pilots and officials.

One of the amusing stories behind the first air mail flight, May 15, 1919, chronicles how Lipsner watched Lt. Boyle precariously get off the Polo Grounds in Washington, D. C., before a host of notables, including President Wilson—then proceed to fly in the wrong direction.

Published by Wilcox & Follett Co., 1255 So. Wabash, Chicago 5, 306 pages, including index and appendices, price $3.00.

Box Cars in the Sky, by Richard Malkin, is a comprehensive and thoroughly documented story of the air cargo business—civil and military. Many of the fast-growing industry's colorful stories lend themselves well to describing the multitudinous operations of the various scheduled, nonscheduled and military freight carriers. Author Malkin, managing editor of several publications including two air transportation journals, packs his volume full of interesting material on what the air cargo operators have been doing in these turbulent years.

The last chapter concerns itself with on-the-spot accounts by Malkin of the Berlin Airlift.

Published by Import Publications, Inc., New York 4, 282 pages, indexed, price $4.75.

New Publications

Revised Index of Military Purchasing Offices, intended as a guide to industry selling the military departments, lists all the commodities (in 35 major categories) which have been assigned by Jan. 1 to one or more departments for centralized procurement. Copies may be had by writing the Central Military Procurement Information Office, Munitions Board, Department of Defense, Washington, D. C.

LETTERS

Saucers

You deserve a medal for your editorial on the flying saucers"

I am with CAA, and Insh This, I fear, is a very bad combination because I am sitting here literally sizzling after reading Admiral Solberg's letter

The Admiral states "Clearance for all flights was obtained from the Civil Aeronautics Authority." The burning part of this is my question How in the-hell does the CAA (or anyone) maintain traffic separation between a 100-ft balloon ascending or descending during instrument weather?" Answer that and I'll be able to rest more securely when riding as passenger in a DC 6 at 20,000 feet

One more point which doesn't fit the Admiral's pitch is the fact that I watched our teletype circuit pour out an account of a Skyhook which came to rest on a farm in Dillon, Mont It told of the confusion of the sheriff, the local CAA and the farmer —then suddenly stated that the F.B.I had taken over Nothing more was heard

Please, for obvious reasons, do not use my name or description

World-Wide Reprint

We would appreciate your permission to distribute to State Department missions in continental Europe Latin America, the Middle East, the Far East and Africa for translation and possible re-publication in local periodicals 'Project Typhoon Aids Missile Designers' by David A Anderton from the Dec 18, 1950, issue of AVIATION WEEK Some condensation of the article may be necessary because of space limitations in foreign newspapers and magazines

Miss Royce Moen, Chief
U S Department of State
Field Publications Section
250 W 57th St
New York

Non Skeds Slip Up

I read with interest your recent editorial condemning the Cosmopolitan magazine's "expose" of the safety record of the unscheduled airlines I agree with you on the points which you covered in your editorial comments There is another type of publicity on the service of the unscheduled airlines and which has more basis in fact I am sending you a clipping from the Wichita Eagle of March 18, 1951, entitled "48 Irate Air Travelers Head East After 13-hour Stop Here"

I would comment, after reading this highly entertaining article, complete with pictures, that this publicity is the type of thing that give air transportation a black eye and makes the railroad operators chortle with glee, except someone would reply that we need more government regulation of the airlines, unscheduled and probably scheduled, as well

Instead, I think that perhaps this type of publicity may force the unscheduled airlines to police themselves, for enough of it is bound to hurt their business Regardless of the way you consider the article, I think you agree that it is a heck of a way to run an airline and that the Eagle really gave the story a big spread

I would like to mention that I'm an AVIATION WEEK reader from way back—back when it was AVIATION, I think you're doing a fine job and I plan to be an AVIATION WEEK reader for many more years

MELVIN H SNYDER, JR., Acting Head
Aeronautical Engineering Dept
Municipal University of Wichita
Wichita 14 Kan

Praise

Your circulation departments asks me why I didn't renew my subscription Your service? It's been excellent Are there any copies due me? I received every one You folks need not be in a quandry any more. You may tell your publisher that I renewed my subscription some time ago You should have received my '51 renewal

AVIATION WEEK has brought me a lot of enjoyment and information in the past weeks You've compiled just about everything in her except the kitchen sink—and you've even written a little about that

I worked in a coated paper mill in Maine this summer and I studied up on the paper industry at that time I try to keep a watchful eye out for good business publications as well as technical and news informatives. You people should be proud If it is at all possible, could you send me the name of the company which manufactures the paper on which AVIATION WEEK is printed

HAZEN LIPSETT
80 Upland Road
Winthrop, Mass

(Kimberly-Clark Corp., Neenah, Wis., makes the paper on which AVIATION WEEK is printed—Ed.)

I think everything you say in your editorial (Flying Saucers and Security) contains a great deal of logic and I agree with you that it is a terrible thing that the Navy should have perpetrated such a hoax for three and a half years

With your permission I am going to quote liberally from your stuff in my Shop Talk column this week and add a few comments of my own.

ROBERT U BROWN, Editor
Editor & Publisher Magazine
New York 18

I would be remiss would I not write to thank you and congratulate you on the excellent story on our process for the extrusion of hollow steel propeller blades, which appeared in last issue of AVIATION WEEK (Mar 19)

Irv Stone did another of the thoroughly, competent jobs which have enhanced both his prestige hereabouts, and that of AVIATION WEEK

RONALD S GALL, Manager
Public Relations
Curtiss Wright Corp
Propeller Division
Caldwell, N J.

Please accept my thanks for the splendid coverage given by AVIATION WEEK to our recently concluded contractors exhibit

I am certain that the success of any future exhibits in our procurement districts will be advanced by the support given to our New York Show by the press, as exemplified by AVIATION WEEK

ARTHUR THOMAS, Brig General, USAF
Commanding
Hq Eastern Air Procurement District
67 Broad St
New York 4

Thanks for a fine write-up in your Mar 12 issue Whoever wrote this item on Brush Alodine really got all of the important and essential details into a very readable form

I am always particularly gratified to see data on our protective coating chemicals in your columns because I have a feeling, verified by actual conversation with men in the aviation industry that AVIATION WEEK columns are very highly regarded by aircraft people

NORMAN P GENTIEU
Technical Editorial Dept
American Chemical Paint Company
Ambler, Pa

(The story was written by Scott Reiniger, of our staff—Ed.)

'Cockpit Viewpoint'

Many of us have been reading R C Robson's column, Cockpit Viewpoint, with much interest We have been impressed by his work and are now looking forward even more to each issue

Incidentally, we have received innumerable requests from all over the U S and from some foreign countries to borrow our All Weather Flight film which Capt Robson referred to in his column Feb 19 It appears many others are reading him too

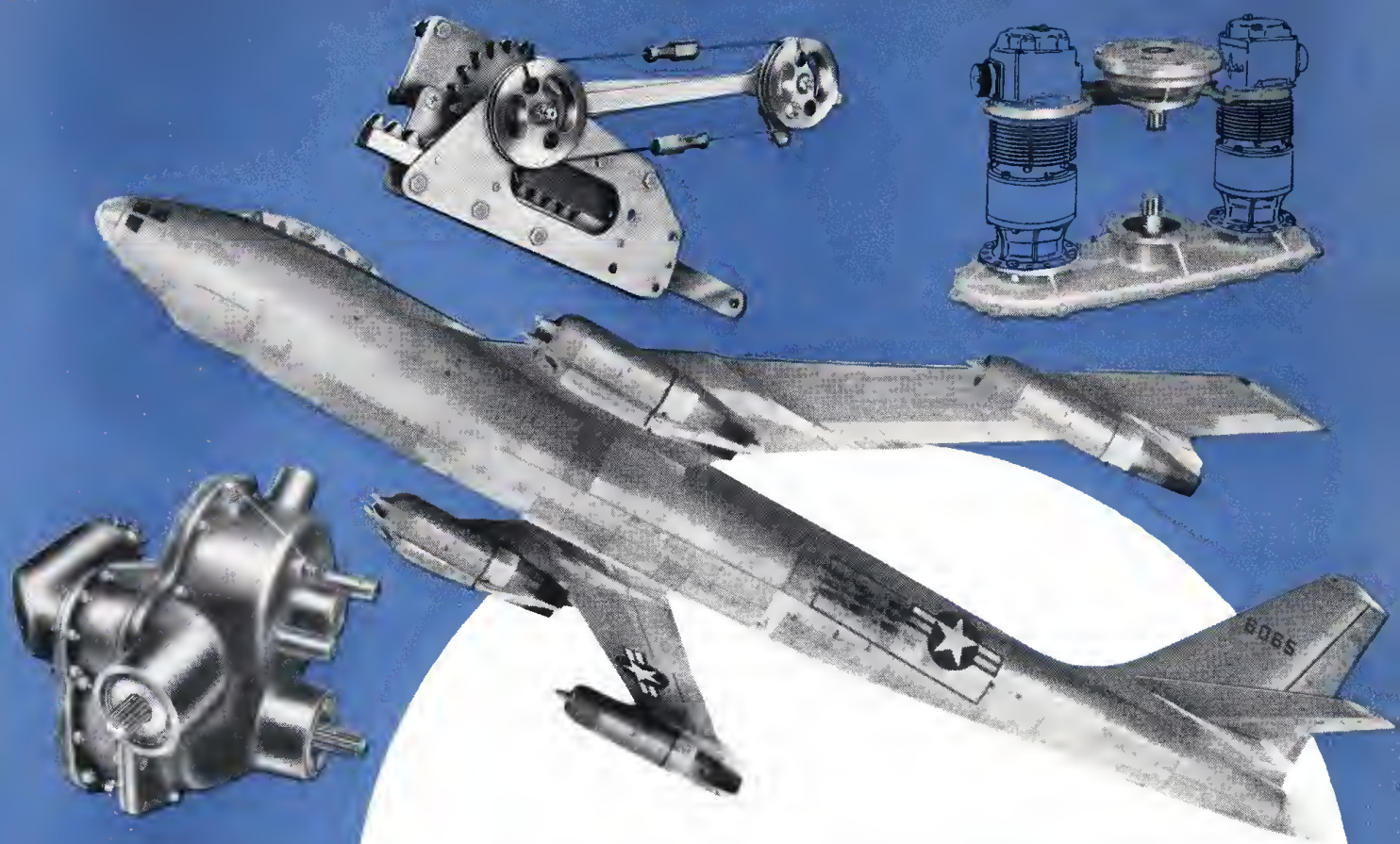
D S LITTLE, Supervisor of Airway Aids
American Airlines Inc
New York, N Y.

PAL & Comet

I have just finished reading Frederick R Brewster's article on the de Havilland Comet (Dec 25, 1950) In it he cited BOAC's Sir Miles Thomas on the Comet's effect on travel time to Calcutta, India "which is now about two days"

Sir Miles is apparently unaware that other airlines make the London-Calcutta run in less time than that. Philippine Air Lines with its DC 6s for instance, makes its regularly scheduled trips between those points in 30 hr and 20 min., total elapsed time This is approximately 18 hr less than Sir Miles' figure and would seem to indicate a saving of only 12 hr for the Comet Meanwhile it may pay passengers who like to travel faster to ride on PAL from London to Calcutta

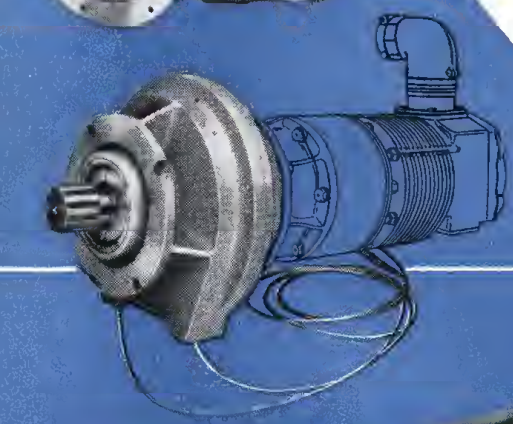
GEORGE CONNICK, Chief Navigator
Philippine Air Lines, Inc
Plaza Cervantes
Manila, Philippines



control mechanisms on the B-47 produced by Foote Bros.

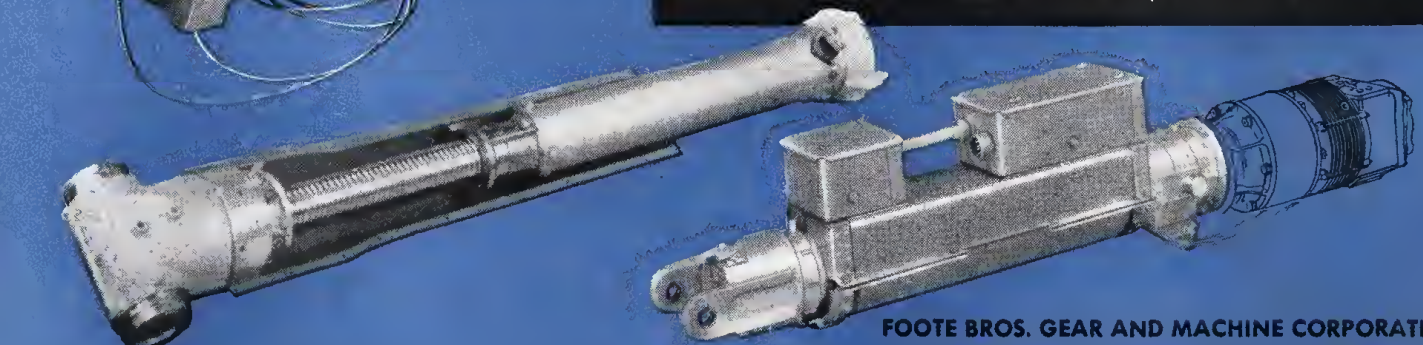
Operating such a sleek air giant as the Boeing B-47 demands control mechanisms that must operate with hair-trigger precision. The speed with which they operate is important — rugged strength to stand unusual loads is important, too. And yet these mechanisms must be light in weight—compact in design.

Illustrated here are some of the units manufactured by Foote Bros. that aid in the amazing performance of the B-47—swift master of the skies.



FOOTE BROS.

Better Power Transmission Through Better Gears



FOOTE BROS. GEAR AND MACHINE CORPORATION
Dept. AVW, 4545 S. Western Blvd. Chicago 9, Ill.